COAL AGE

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PERSONAL INITIATIVE is about the most important quality any coal-mining man can possess. The world is filled with human monkeys, who shape and time their every action according to what they term the "best accepted practice."

They use this machine or that pump because someone they know is an ardent advocate of these particular types. The method of development and the system of ventilation employed in the mines they boss were inherited from their predecessors, who probably were nineteenth century men, following methods adapted for that age.

If a man is paid to work only with his hands, then the less thinking he does, the better he will please his employer. But coal-mine officials are hired to figure and reason, and the fellows who are only echoes of somebody else, or reflections of current conventions, will never attain any permanent eminence. The spirit which gets its code of conduct from what everybody does is pernicious and opposed to the true growth of the individual.

Did you ever sit down at your desk and ask yourself these questions: Why am I mining on the present system? Is it the method which gives me maximum extraction, greatest ease of production, and highest safety? Are the pillars that now remain the proper size for the cover the coal supports, and are the rooms the correct width and length?

Perhaps the man who inaugurated the system you follow didn't know his business at all; or maybe the seam today has a couple hundred feet more overburden that when the present method was adopted. Likely the character of the coal, the roof, or the bottom has changed materially. The bed may be thinner, water more abundant and the pitch of the seam entirely different.

How about your present plan of undercutting the coal? Possibly you should use punchers in your entries and other narrow work, while employing some fast type of chain machine in rooms. Then, in regards to haulage—Have you studied your problems until you are satisfied on every point? Do you know for sure that gathering motors won't reduce your cost per ton; or, if you haven't electricity in your mine, are you positive that gasoline motors won't effect a saving for you?

In ventilation, as well as about your surface plants, dozens of problems are crying for an answer. The remainder of this issue could be devoted to nothing else but a recital of them. Suffice it to say that no man can be superior to his fellow humans if all he seeks is in others rather than in himself. Originality is at a premium. The world makes way for the man with a new idea, and there are plenty of the latter left. All good things have not been done.

And, remember, originality consists not so much in presenting something that is actually new, as it does in *rearranging* what you have gleaned from reading, observation, and experience. The planting of new truths is not so difficult a task as the rooting out of old errors; for there is this paradox in men—"they run after that which is new, but are prejudiced in favor of that which is old."

Why not resolve that during the next month you will question the cause for your every deed. Decide you are more than an automaton. The chances are you will find yourself unable to satisfactorily explain why you are following certain methods, and the reasons for a majority of your actions.

Just being busy every minute of the working day isn't sufficient. The difference between those who succeed and those who fail does not consist in the amount of work done by each, but in the amount of *intelligent* work accomplished. Many who fail, do enough to achieve grand success; but they labor at haphazard, building with one hand and tearing down with the other.

The Federal Valley Field in Ohio

By A. T. Shurick

A description of an isolated and little known field in southern Ohio in which the No. 8, or Pittsburgh seam, occurs under conditions especially favorable to economical mining. The district has been developed but little owing to adverse transportation facilities, but has one of the most modern steel and concrete plants in the state.

The Federal valley field is one of the few economically accessible districts of the Appalacian region, which still remain practically undeveloped. It has probably one of the richest seams of a high grade steam coal in the state, and is so situated as to present ideal conditions for economical mining.

On the other hand the region has been facing an insuperable obstacle in the shape of inadequate transportation facilities, which has curtailed production to a mere nothing and is the primary cause of the present state of undevelopment.

Location and General Conditions

This field is located in southeastern Ohio, on the Marietta, Columbus & Cleveland R. R. It is about 30 miles east of Athens and 70 miles southeast of Columbus. The country is rough and hilly, being traversed by numerous wandering streams which have eroded valleys and ravines, forming relatively abrupt hillsides in which the coal crops out. The outcrops along the Federal Creek and Sharps Fork are so extensive that the field may be attacked at almost any point desired, and quite economical mining effected.

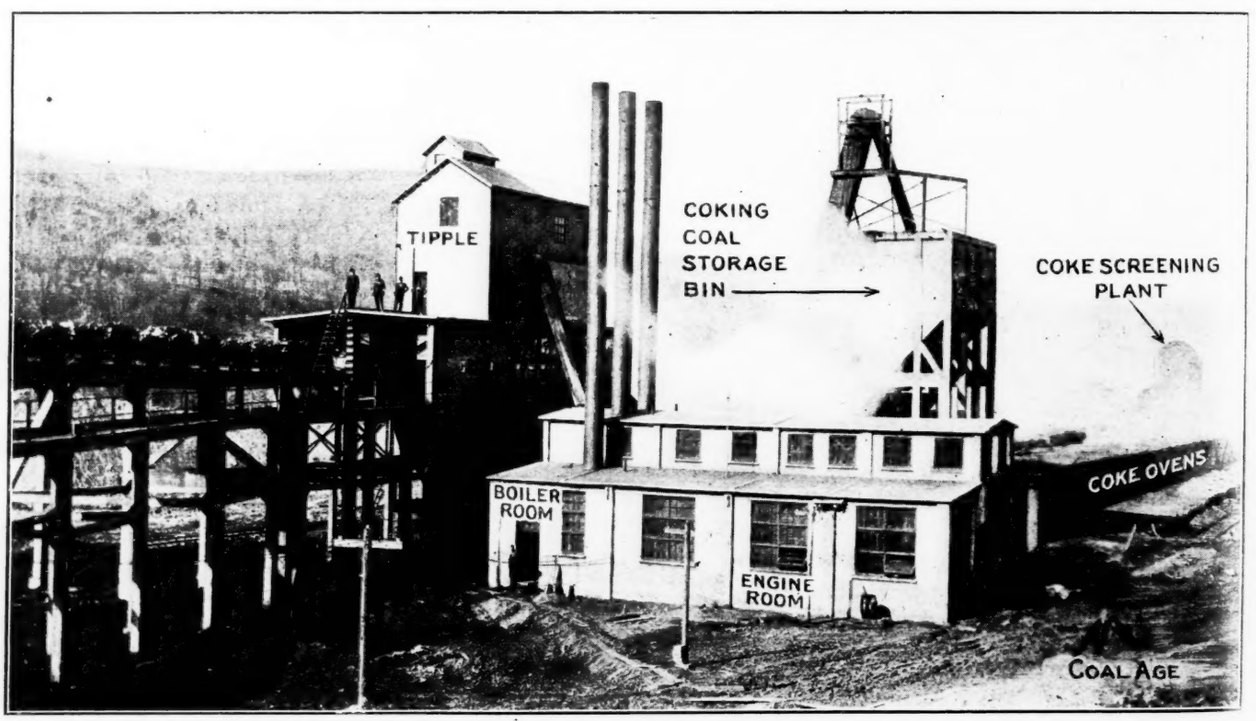
As before mentioned the railroad service has seriously crippled the coal industry in this district. In this respect there is a condition in effect probably unique in the history of coal mining—that of a carrier, which will not supply itself with cars, and which apparently prefers to subside into a condition bordering on bankruptcy rather than invest in equipment which would in a comparatively short time build up a highly remunerative business for it. In a trip over the road, one is impressed with the evident high cost of construction. Numerous rock cuts are encountered, which would closely approach in size those on the now famous Virginian Ry., while high and expensive frame trestles abound. Offsetting this are a track condition and road bed that would be regarded as a disgrace at any of our modern coal mines. Not only the right-of-way, but the road bed itself is overgrown with vegetation and country stores at crossroads serve generally for the stations.

Geology

Probably the only coal of importance in this immediate district is the one variously known as the Pittsburg, Pomeroy, No. 8, and the Federal Creek seam. It is said to form approximately the base of the Upper Productive Measures of the Carboniferous period. About 400 ft. below this seam occurs the famous Nelsonville or No. 6 coal, which is worked so extensively in the Hocking Valley.

The measures in this district are said to have a gentle dip to the south or southeast of about 27 ft. to the mile or about 0.5 per cent., and this figure is substantiated by all available data of this kind. The coal appears from under the high hills to the north, and the outcrop is easily followed south down the Sharps Fork Valley, where it is from 50 to 60 or 70 ft. above the railroad. Numerous showings are found on Marietta Run, Federal Creek and other points. Continuing south the seam gradually goes under cover until at the Hocking River it is 60 to 70 ft. below the surface.

The seam throughout the district appears remarkably regular, and no serious faults of any description have yet been disclosed. The following is a typical section of the coal taken at the face



General View of the Black Diamond Coal & Coke Co.'s Surface Plant, at Lathrop, Ohio.

of the 4th South entry in the Black Diamond Coal & Coke Co.'s mine:

	Inches
Hard shale	2
Coal	37
Bone	5
Coal	4
Soapstone	9
Coal	46
Flint fire clay	?

In this same mine a local thinning of the coal is occasionally encountered, the most persistent of which is one on the west side of the mine. This is confined almost entirely to the top coal, which is reduced to nearly 2 ft., including the bone. It follows an irregular line, as noted on the map, and has been driven through at one point where it was found to be nearly 600 ft. wide. Such coal as this is termed deficient and is not worked with rooms; aside from the territory thus lost, and the additional narrow work necessary it entails no particular expense.

The Black Diamond Coal & Coke Co.

In spite of the adverse conditions in effect in this field the Black Diamond Coal & Coke Co. has succeeded in making some showing and is today the most important operation there. Presumably by making arrangements with other roads whereby the latter would send in their own equipment for loading, this company has found it possible to work comparatively steady over a number of relatively long periods.

This company first entered the field about 1890, and seems to have had a rather prosperous career until March, 1901, when the mine was closed down and remained idle until October, 1906. Preparations for again opening up were then started and in May, 1907, the company began shipping at the rate of 250 to 300 tons per day, which was continued until November, 1910, when their surface plant was completely destroyed by fire. Plans for reconstructing in steel and concrete were then drawn and the new plant completed in December, 1911. Since then this company has been working quite steadily and producing about 400 tons of 1¼-in. lump per day.

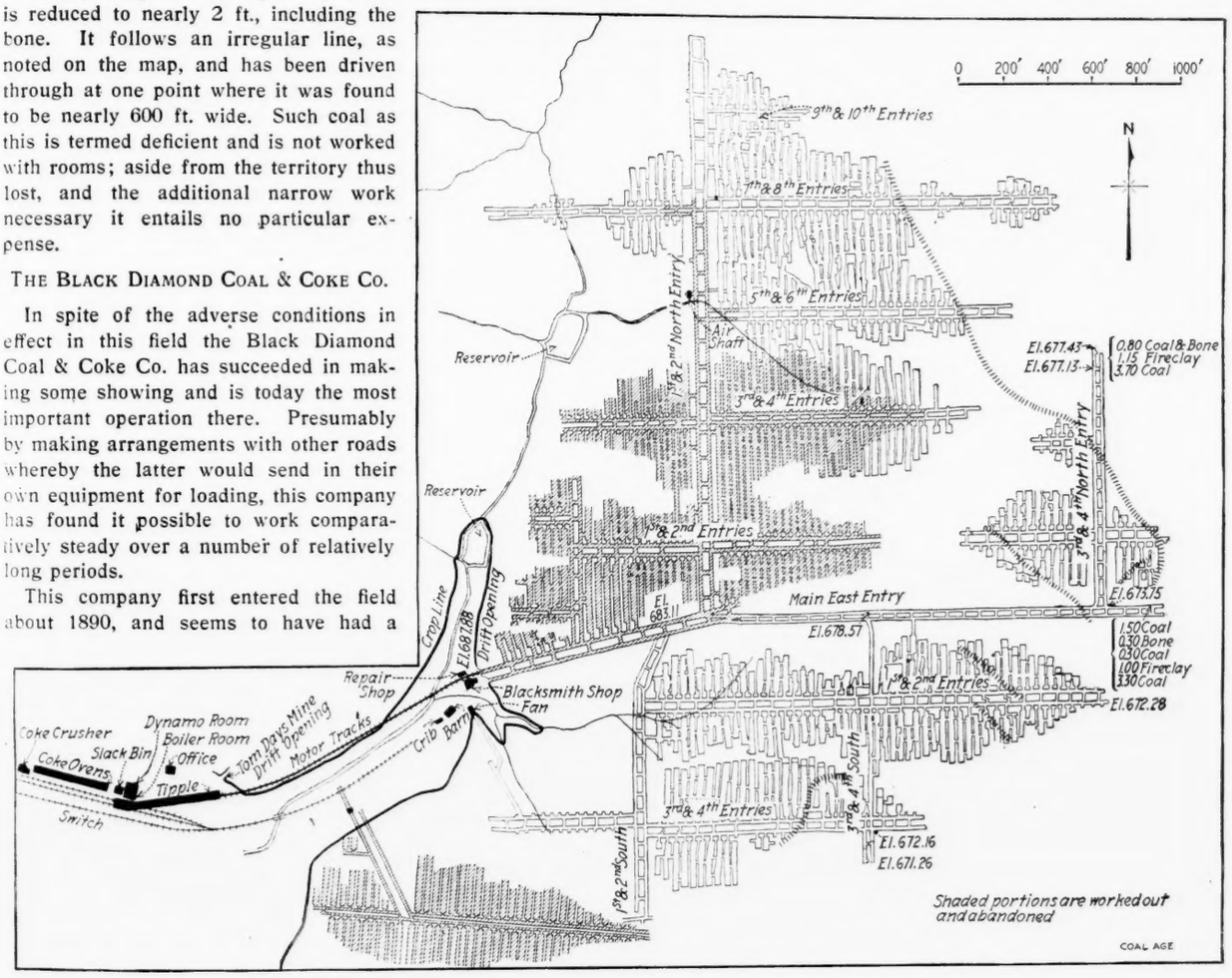
The general surface arrangement at the Black Diamond mine is shown on the accompanying mine map, on which it will be noted there is an outside haul of nearly 1100 ft. from the mine to the tipple. Nearly all the surface plant is located around the tipple which is shown in the accompanying halftone.

Surface Plant

The tipple, including an approach trestle of about 400 ft. in length, is built of steel and concrete throughout, as is nearly all of the surface equipment. There is a 72-ft., 100-ton capacity railroad track scale, also having a concrete foundation.

The tipple is equipped with a Phillips dump and has a capacity of 1500 tons in 8 hours. The loaded track has a grade of 1.5 per cent. and the empties 1.75 per cent. The screens are set on an angle of 30 deg., and in accordance with the mining scale only that passing over a 1¼-in. screen having a superficial area of 72 sq.ft. is paid for; about 40 per cent. passes through and is elevated to a revolving screen 6x4ft., where that passing through the ½-in. perforations is sent to the crusher, and the remainder sized into nut and pea and run into a concrete storage bin. This bin has a capacity of 40 tons and is so arranged that either nut or pea can be loaded out or both. All the tipple machinery is run by a single 10-hp. motor.

The boiler room is equipped with three 18-ft., 150-hp. Erie boilers. Pumps are used instead of injectors, and there is also a Stillwell heater. In the engine room there is a 16x16 McEwen engine running at 225 r.p.m. and driving a Jeffery 100-kw., 250-volt, direct current generator which furnishes the power for the haulage. To supply power for running the machines there is a Ridgway 19x18, 238-hp. engine running at 205 r.p.m. and driving a 250-volt, 150-kw., direct current generator of the same make. These two generators may be coupled up to run together if necessary. The crusher engine, 16x22, is also located in the engine room, the general dimensions of which are 40x65 ft. This engine runs at 164 r.p.m. and is belt-connected to the crusher, which is on the outside of the building.



Map of the Black Diamond Coal & Coke Co.'s Mine and Surface Plant

The coal sent to the crusher is reduced to a fine powdery consistency as it has been found that this gives a better grade of coke and one which will not disintegrate so readily. It is then elevated into a 300-ton capacity hopper bottom concrete bin, from which it is fed into a 6-ton larry, which is the required charge for the ovens. This larry runs down the ovens by gravity and is pulled back by a small stationary engine under the storage bin.

The coke ovens are the ordinary beehive type, 12 ft. in diameter and 50 in number. Both 48- and 72-hour coke are made and while the product is not sufficiently strong for furnace use, it is a fine silvery grade that finds a ready market in the domestic trade. The 42-hour runs about 12 in. long and shows a noticeable absence of the hard metallic ring characteristic of the 72-hour, which runs 20 to 26 in. in length.

At the lower end of the ovens is a bin equipped with chutes for loading on railroad cars. It also has a crusher and a 6x14-ft. revolving screen for grading the coke to sizes varying from ¾ to 1½ inches.

System of Mining

The double entry and room-and-pillar of mining is used. Entries are driven 12 ft. or 4 cuts wide and have 28-ft. pillars, while rooms are 30 ft. or 10 cuts wide and have 10-ft. pillars. Cross cuts are driven every 60 ft., as required by the law, and brick stoppings laid in cement mortar are used on the entires.

The track gage is 42 in. and entries are laid with 30-lb. steel while 16-lb. is used in the rooms. Cars are of 2-ton capacity, and handled in trips of from 15 to 30 cars. Horses are used to make up the motor trips but it is the intention of the company to dispense with these in the near future and use electric haulage exclusively.

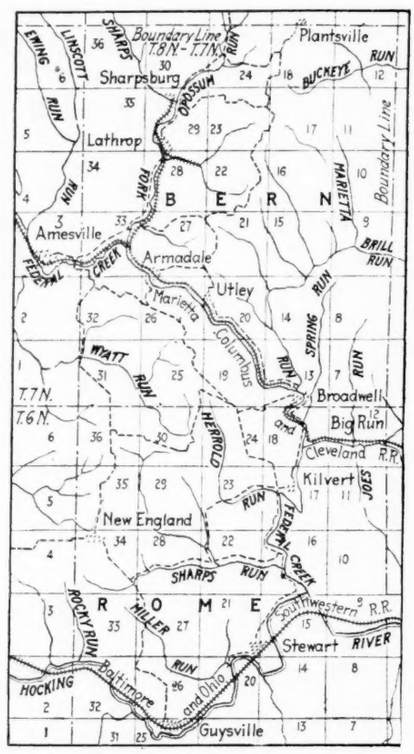
The roof conditions are such that very little timber is used in the mine. With rare exceptions the only timber required is a double row of posts in the rooms, none whatever being used in the entries. The roof is composed of about 20 ft. of shale, and it has been found that instead of falling in large masses this tends to chip off in small pieces, forming an elliptical cross-section which is very self-supporting.

Ohio is the leading state in the country in the production of machine-mined coal. In 1910, 84.44 per cent. of the total production was mined by machines, and in 1909, 79.5 per cent. This field is no exception to the general rule in Ohio, as practically all of the coal in the district is machine-mined.

The Black Diamond Coal & Coke Co. have six of the Morgan-Gardner chain machines, of which two are the G type and four the H. G. type. These machines have a capacity of 175 lineal feet per 8-hour shift.

Mining is done in the bottom of the seam immediately on top of the fire clay. This fire clay varies from 24 to 36 in. thick, is of a hard, flinty character, and forms an excellent base for the machines to work on.

The mine is ventilated by a 15-ft. Robinson fan, which running at 60 r.p.m. furnishes 35,000 cu.ft. of air per minute.



THE FEDERAL VALLEY COAL FIELD

This fan has produced 36,000 cu.ft. of air per minute at a one-quarter inch water gage.

The Wage Scale

The screened coal basis of payment is in effect in this district, the new scale adopted during the current year being a slight increase over that for the previous period. Machine runners in narrow work are paid 14.35c. and 10.5c. in rooms. Loaders when provided with electric drills are paid 55.5c. in rooms and 68.85c. in entries, and for hand drilling are paid 58.5c. in rooms and 71.85c. in narrow work.

The loaders are required to keep the places up in condition, lay all the necessary track and put in the timbers. Outside wages run generally from $1.56 to $3.12 and inside from $2.62 to $2.84, with the exception of trappers who are paid $1.32. Only coal passing over a 1¼-in. screen, having a superficial area of 72 sq.ft. and set on an angle of 30 deg. is paid for; about 40 per cent. of the product goes through the screen.

The following is an analysis of both the top and bottom coal and an average of the two:

	Top coal	Bottom coal	Average
Moisture	3.31	3.35	3.25
Volatile matter	44.16	45.44	45.15
Fixed carbon	47.40	45.01	46.79
Ash	5.13	6.20	4.81
Sulphur	3.30	3.76	3.34
B.t.u.	13,685	13,620	13,746

In conclusion I wish to acknowledge the many courtesies extended by Mr. A. E. Lafferty, of Sharpsburg, O., the superintendent of the Black Diamond Coal & Coke Co., which have made possible the compilation of this article.

Coal Production in Montana

The production of coal in Montana in 1911, according to a statement just issued by the U. S. Geological Survey, was 2,975,358 short tons, with a value of $5,339,058. The figures show an increase over the production for the previous year, which was 2,920,970 short tons, valued at $5,329,322.

Montana's coal production has increased steadily during the last three years, the gains being due chiefly to the developments in the Bull Mountain field, which was opened in 1908, after the construction through it of the Chicago, Milwaukee & Puget Sound Ry. In its increased production in 1911 over 1910, Montana furnished a marked exception to the condition prevalent among the Rocky Mountain states. The increase was not large, but in a year of general decrease it was relatively important though attended by a slight decline in price. In 1910 the production of the Bull Mountain field was divided between Fergus and Yellowstone counties. In 1911, a new county, Musselshell, was created which embraces all of this new field, and the new county appears with a production of 706,364 tons. Some of the Montana coals possess coking quality and considerable quantities of coke have been made in Park County. All the ovens were idle, however, in 1911.

The number of men reported as employed in the coal mines of Montana in 1911 was 3866. The average production per man was 770 tons for the year and 3.5 tons for each working day.

Only two labor disturbances were reported during 1911. In one, 118 men were idle 20 days and in the other 4 were idle 14 days. The total time lost was not sufficient to influence the production.

At the Carl Alexander pit, Germany, over 60,000 ft. of bore holes were put down in eight months while preparing to sink a shaft by the freezing process.

Design of Mine Trolley Lines

By E. L. Cole

When care is taken to align trolley wires correctly, a large saving in trolley wheels, time and annoyance is effected thereafter. This article shows approved methods of attaching and adjusting the hangers of a trolley line, so that there will be a minimum risk of the wheel leaving the trolley wire.

Although mine managers as a whole realize that uninterrupted service is a vital factor in the successful operation of their coal mines, they often overlook the importance of the proper design and erection of trolley lines. This is evidenced by the construction exhibited in many of our coal mines today. If space would permit, I could relate more than one instance of serious economic losses sustained in coal mines because this important work was delegated to men who had but a faint conception of the work in hand.

The purpose of this article is to point out various methods of solving the difficult conditions which are sometimes met with underground. These methods have been adopted as standard by successful operating electrical engineers.

Outside Trolley Wire Supports.

Fig. 1 is an elevation of the overhead trolley-wire supports for a single track on the outside of a mine. As shown in the drawing it is made up of 3-in. wrought-iron pipe, resting on and imbeded in a concrete base. A hole is provided in the pipe near its lower end for the insertion of a twelve-inch piece of one- inch gas pipe. This serves as a key to prevent the lateral stresses on the trolley lines from deflecting the column from its position.

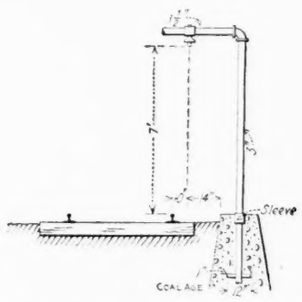


Fig. 1. Elevation, Single-track Trolley-wire Support

When first constructed, the vertical gas pipe support was made of one piece of pipe from the bottom of the concrete pier to the cross piece. Not long after the work was completed the inevitable accident occurred. A ten-ton locomotive was derailed and broke the column off even with the top of the pier. Since then all columns have been built as shown in Fig. 1, with a short length built in and protected by the concrete of the foundation, and with a sleeve screwed on the upper end. Experiments have proved that the joint does not lessen the rigidity of the column. In case of a wreck, the broken part of the pipe can readily be cut away with a diamond-point chisel, the short end of the injured pipe unscrewed, and a new piece of pipe substituted without serious delay.

In making up the joints, care must be exercised to see that all pipe are carefully threaded, and the ends of the pipe cut off square, preferably with a hacksaw. Turn both pieces of pipe into the fitting an equal depth until they meet. If this method of making joints is adhered to, no trouble will be experienced. On top of the vertical pipe is screwed a 3-in. ell, the horizontal outlet of which is bushed to receive a length of 1½-in. pipe. This supports a 1½-in. standard mine pipe hanger. The distance between trolley line and track rails has been standardized at seven feet vertically and ten inches laterally for all outside work. At times the engineer will find it necessary to increase the height of trolley lines where a wagon road crosses the car tracks. In such instances the line should be raised gradually, as shown in Fig. 2.

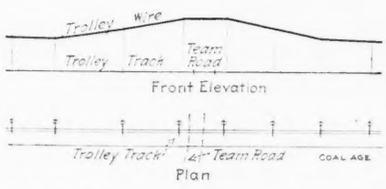


Fig. 2. Manner of Elevating Trolley Wires over Roadways

Double Track Wire Supports and Dead Ends.

Fig. 3, sketch A, is a double-track elevation of a similar design to that in Fig. 1. The method has given excellent service since it was adopted three and a half years ago. Sketches B and C in Fig. 3 are detail views of a substantial dead end for outside trolley lines, made up of two forty pound "T" rails imbedded together in a concrete pier and rigidly held by three half-inch iron plates secured to the rails with half-inch rivets. In the center of the top plate a three-quarter inch hole is provided through which a five-eighths inch hook bolt passes and is secured by two nuts.

The method of affixing this dead end is simple and labor saving. The wire is cut off at the proper length and bent back. A three-eighths inch chain link is slipped over the hooked end of the trolley wire and hammered back into place, after which the wire is again given a short return bend and is ready to be fitted into the clevis end of a five-eighths inch conical strain insulator; the other end engages the five-eighths inch by fifteen inch hook bolt. The use of a conical strain insulator with a clevis on one end permits the expeditious renewal of grounded insulators.

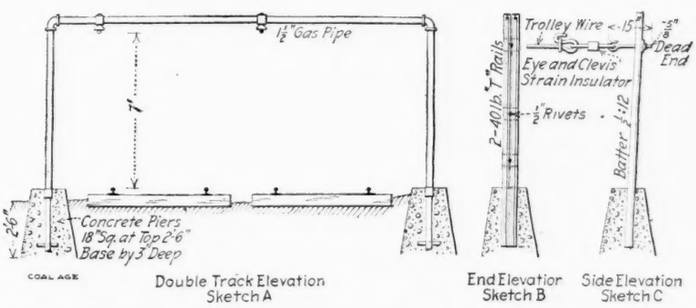


Fig. 3. Method of Supporting Trolley Wire for Double Track with "Dead Ends" to Resist Strain

Manner of Wiring.

Fig. 4 is a plan of outside and inside trolley line construction, showing double track and curve suspension work. The reader will note that the distance between the outside track rail and trolley wire is kept equal at all points. Whereever the track curves, the trolley line columns are reinforced by a quarter-inch galvanized-wire strand, which is suspended between the columns, and acts as an anchor for the short open wires which are suspended in a transverse direction to the tracks. All of these are protected by conical strain insulators, as are the lines between the columns. It is at best a poor policy to

skimp the number of supports, and it is better to err by erecting one span wire too many, than to have a trolley line out of true alignment.

At the mine entrance there is provided a section insulator of the manually operated type with a switch placed on one side; the handle is brought out at an angle of about forty-five degrees, and is so located that the motor man can easily throw it in or out as desired.

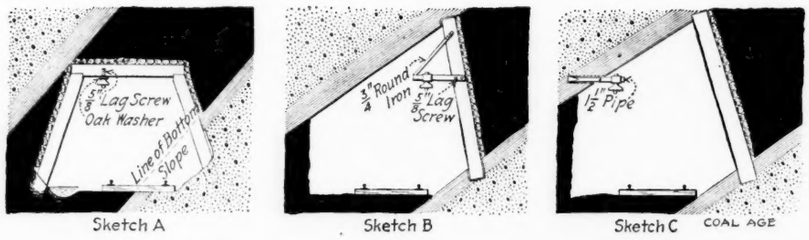


FIG. 5. THREE METHODS OF TROLLEY-WIRE SUPPORT IN ANTHRACITE COAL MINES

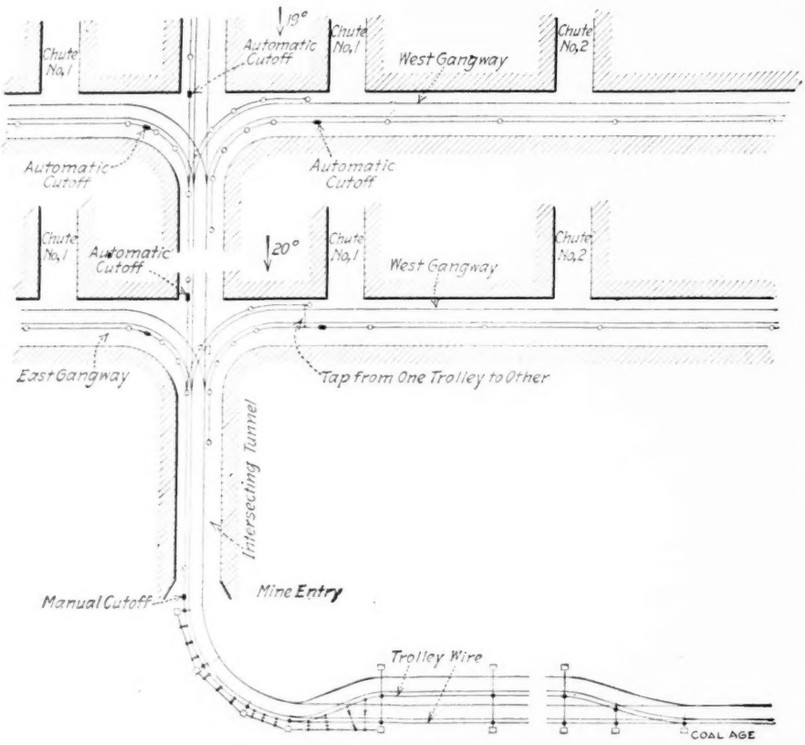


FIG. 4. PLAN OF INSIDE AND OUTSIDE MINE TRACKS WITH TROLLEY WIRES, SHOWING DOUBLE-TROLLEY SYSTEM

In mines where the coal measures do not exceed seven feet in thickness, and the roof is in a horizontal plane, it is only necessary to secure the mine hanger to the roof by means of an ordinary five-eighths inch bolt secured in place with the usual cast-iron wedge. Where the roof is supported by timbers a screw hanger is used as shown in Fig. 5, sketch A. Where the timber is partially decayed, I find an oak washer of the same diameter as the face of the hanger and about one inch thick is effective, as it affords a solid face for the top of hanger and prevents it from moving out of alignment.

Sketch B, Fig. 5, shows an inexpensive method of supporting the trolley wire in gangways where it is permissible and desirable to do so. For instance, it can be used in underground roadways where the work of mining has ceased, but where the heading is still used as the nearest available route to other parts of the mine. The support consists of a piece of one and one-half inch pipe of the required length secured to the side of the "leg" with two five-eighths inch lagscrews, reinforced with a piece of three-quarter inch round iron of equal length bolted to the end of the hanger and secured to the timber with two five-eighths inch by three-inch lagscrews.

Sketch C. of Fig. 5 shows the best method of erecting trolley line supports in the low side of untimbered gangways where the roof inclines at various angles.

A hole is drilled, varying in depth from 8 to 14 in., depending entirely upon the nature of the roof. The pipe is keyed into position by a round iron plug wedge. The hole in the roof is drilled large enough to permit the pipe to enter freely, the plug wedge being in the end of pipe. It is driven home with a medium weight sledge, the cap shown in the detail drawing being used to protect the end of the pipe (see Fig. 6). The pipe support is purposely made longer than required at the time of erection, providing room for moving the hanger into alignment at any time should the track rails be shifted out of their original position. This provision has been found very convenient around curves.

PIPE SUPPORTS FOR MINE HANGERS.

Fig. 6 shows an inexpensive, but efficient method of installing pipe supports in the roof of tunnels. Holes are drilled in the rock one-sixteenth inch larger than the pipe to be inserted. This pipe is split at one end. A tapered plug is fitted in the end, and both are pushed into place. On driving, the pipe is expanded and grips the end of the hole securely. I have found the small round iron plug wedge very effective, and of several hundred installed, have yet to record one failure. It should be noted that the pipe is heated to a cherry red before cutting. The cut is made on both sides for a dis-

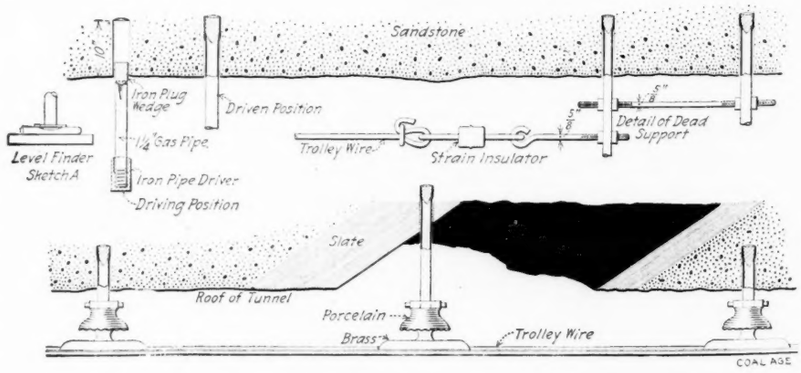


FIG. 6. METHOD OF SETTING PIPE HANGERS IN ROOF OF MINE, PLUMBING THEM AND SETTING DEAD ENDS

tance of three inches. This prevents the pipe from cracking; thus the possibility of its breaking off in the top of the hole when the wedge is driven home is entirely avoided.

As shown in Fig. 6, it is an easy matter to keep the trolley wire at a uniform height in tunnels where the roof varies, as it does when crossing coal beds. In fact I have had no trouble with pipes six and a half feet long.

The Level.

I find the level shown in Detail A, Fig. 6 very useful while installing hangers, whether on the tunnel roof, or directly on the timbers. When the hanger is secured on the support, screw the level finder on the hanger stud, placing it parallel with the track rails. If found correct, turn it until it is in a position at right angles to the track rails. If found out of plumb a small tapered wooden wedge will be found sufficient to bring it into alignment; if it is secured to a collar it should be taken down and the face of the collar cut square with a sharp hatchet. For horizontal, and vertical pipe supports, holes for which are purposely made one-sixteenth of an inch large, it will be found best to drive two to four small iron wedges made to conform with the outside diameter of the pipe and interior of the hole.

When careful attention is paid to the leveling and plumbing of the trolley hangers, the erector will be amply repaid by the rapidity with which he will be able to string the trolley wires. He will note that the trolley pole does not leave the wire and that the trolley wheels have a greatly lengthened life.

In the detail drawing is also shown a substantial method of dead ending underground trolley lines. A piece of pipe similar to a hanger support is anchored in the mine roof, and the end of the wire adjusted in a similar way to that of a terminal of the outside trolley line. A short distance away a second pipe is installed and a five-eighths inch bolt threaded on both ends will be found very effective in keeping the anchor support rigid.

Use of Two Trolley Arms

In the first and second west gangway plan (Fig. 4) is shown the method of changing the trolley line from one side of road bed to the other, as local conditions sometimes necessitate. For this purpose the locomotive is furnished with two trolley poles, one on the right and the other on the left side of the locomotive. The motorman enters the gangway in the usual manner, and at the most convenient point places the other trolley pole in position, after which he pulls down the other pole securing it under a strap iron hook eighteen inches long which forms part of his equipment. This work is done while running on reduced speed, and this is a convenient method of eliminating annoying delays. On straight tracks the hangers should not be placed more than 30 ft. apart. On curves they should be placed closer so that the overhead wire will bear the relation to the rail which has been recommended for outside track wires. Span wires could be used as on the surface but are not to be recommended as the cost of maintenance will be far less when such wires are not used to curve the trolley line.

An automatic sectional insulator should be placed in every gangway. When the pin, on which the moving part rides, is occasionally oiled, the insulator will work without difficulty. Feeders should at all times be tapped to the trolley lines by means of a standard feeder ear. If the cross-section of the feeder cable exceeds the capacity of the feeder clamp the ends of the cable should be fanned out until the current capacity of the taps will equal that of the feeder cable. Splices in the trolley line may be efficiently and quickly made with the key type splicing sleeve.

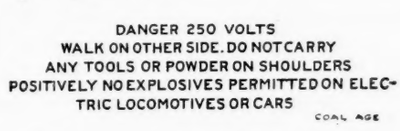

DANGER 250 VOLTS
WALK ON OTHER SIDE. DO NOT CARRY
ANY TOOLS OR POWDER ON SHOULDERS
POSITIVELY NO EXPLOSIVES PERMITTED ON ELECTRIC LOCOMOTIVES OR CARS
COAL AGE

Fig. 7. Danger Sign for Use with Electric Trolley Lines

When determining the size of the trolley line, it is well to bear in mind that the tendency is to add more locomotives, and it is always best to provide sufficient copper for the maximum amount of current required, which can readily be determined by the following formula:

$$CM = \frac{22 \times D \times C}{L}$$

Example: Determine the size of the feeder required to transmit three hundred amperes 3000-ft. permitting 15% drop in a line voltage, of 250 volts. L = Loss in voltage = 15% of 250 volts = 37.5; D = 3000 ft.; C = 300 amp.; 22 = Constant.

$$CM = \frac{22 \times 3000 \times 300}{37.5} =$$

CM=528,000.

In practice a 4/0 trolley line with a 4/0 feeder running to the center of distribution would be installed, tying feeder line to trolley line every five hundred feet with 1/0 taps.

When the overhead construction has been installed in accordance with the foregoing rules, there is an entire absence of annoying break downs. In order to prevent accidents the notice Fig. 7 should be posted in conspicuous places. The use of such a notice will relieve the company of liability, putting the burden of self-protection upon the miner.

Missouri Increases Coal Output

The final figures for the coal production of Missouri in 1911, according to the U. S. Geological Survey, show an output of 3,760,607 short tons, valued at $6,431,066. This is a notable gain over the production of 1910, and if the banner year, 1907, is excluded, it exceeds the output of the state in any other year since the beginning of coal mining.

In 1910, coal-mining operations in Missouri, as in the other states of the Mississippi Valley region, were suspended for a good part of the year on account of labor troubles, resulting in a decrease in output for Missouri from 3,756,530 short tons in 1909, to 2,982,433 tons in 1910. In 1911 the industry was practically free from labor disturbances and the output showed an increase of 778,174 tons, or 26.1 per cent. The value increased $1,102,781, or 20.7 per cent. The average price in 1911 was $1.71 a short ton, compared with $1.79 in 1910.

Surrounding Coal Beds Strong Competitors

The production of coal in Missouri during 1911 was normal, and no marked increase in the future above that due to increased population in the rural districts may be looked for. Missouri is surrounded by other important coal-producing states, where mining conditions are better than in most of the Missouri districts, and the larger cities of the state, St. Louis and Kansas City, draw their fuel supplies in great part from the bordering states. The markets for Missouri coals are restricted to comparatively local territory, largely rural, and the railroads. Illinois coals are the principal competitors in the east. The coal industry in Missouri suffers also, however, from competition with oil and natural gas.

The coal mines of Missouri, in 1911, gave employment to 9991 men, who worked an average of 183 days, against 9691 men for an average of 154 days in 1910.

To Missouri's coal production, as reported by the Geological Survey annually, during the last few years, should be added a considerable quantity that is credited to Kansas. The workings of the mines at Leavenworth, Kan., on the Missouri River, extend under the river into Missouri territory, and the larger part of the coal reported as produced in Leavenworth County, Kan., is, in fact, mined in Platte County, Mo. This probably amounts to 250,000 tons a year.

Those who work for a man should come next in consideration after his own family. In other words, the nearer industry comes to be a family affair the less likelihood there is of disruption.

Coal Mine Ventilating Equipment

By W. M. Weigel*

Mechanical and volumetric efficiencies of fans. Every fan has a point of maximum mechanical efficiency, which, at a fixed speed, depends on the volume discharged. As far as possible, therefore, a fan should be selected to suit exactly the needs of a particular mine in regard to pressure and capacity. The seventh of a series of articles on mechanical ventilators.

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The mechanical efficiency of a ventilating fan is the ratio of the work done on the air to the work delivered to the fan by the engine or motor, and is the only true indication of its economical operation. The useful work done on the air in foot-pounds is the product of the pressure in pounds per square foot and the quantity of air passing, in cubic feet per minute. If p = pressure in pounds per square foot and Q = quantity in cubic feet per minute, then the horsepower of the air $= \frac{pQ}{33{,}000}$.

The power delivered to an engine-driven fan may be determined by taking indicator cards of the engine, and then deducting from the indicated horsepower an allowance for the engine losses. The engine alone should first be indicated, if possible, to determine its efficiency at varying loads. This may be done by means of a prony brake, but such a test is seldom practicable at a fan installation. The efficiency of the ordinary engines will vary from 85 to 90 per cent.

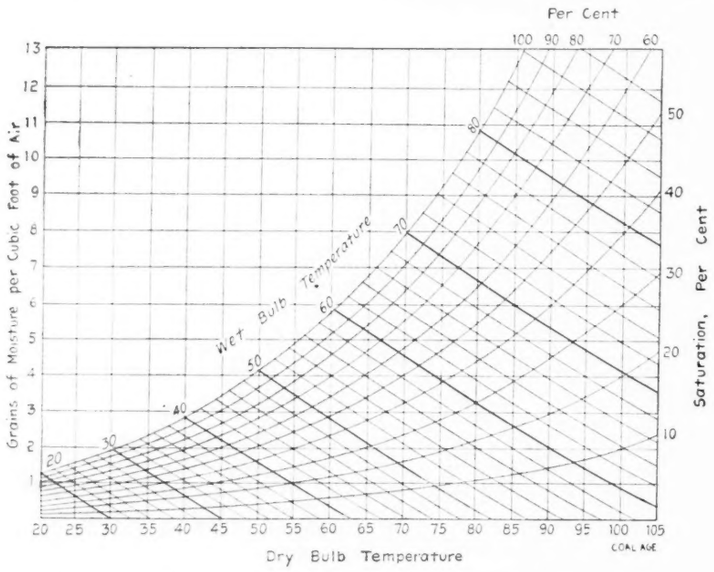

FIG. 1. DIAGRAM SHOWING DEGREE OF SATURATION OF AIR AT VARIOUS TEMPERATURES

If the fan is belt driven, the efficiency of the belting will vary from 90 to 95 per cent. If a motor is employed to drive the fan, the power delivered to the motor is easily measured by an indicating wattmeter for alternating-current motors and by a voltmeter and ammeter for direct-current motors. The efficiency of motors will vary from 90 to 95 per cent.

After making the proper deductions then, the power delivered to the fan is obtained and from this the mechanical efficiency is calculated. Many tabulated results of tests give only the combined efficiency of the fan and engine, which is not fair to the fan, inasmuch as a large part of the loss in power may be due to the engine.

DETERMINATION OF AIR PRESSURE

The total or dynamic pressure of the air at the inlet of an exhaust fan or the outlet of a blowing fan must be determined. If the velocity pressure is taken from the calculated velocity of the air at these points, then it must be corrected for temperature and barometric pressure. The velocity pressure in feet of air column is:

$$h = \frac{v^2}{2g} \qquad \text{I}$$

If d is the weight of a cubic foot of air under the given conditions, then the velocity pressure in pounds per square foot is $d\,h$. If the static pressure is measured by a water gage, as is usually the case, this pressure in pounds per square foot will be $5.2\,i$, where i is inches of water column; since 1 in. of water column is equivalent to 5.2 lb. per square foot.

The weight per cubic foot of the air d may be found by the following formula:

$$d = \frac{1.3273}{T}(B - 0.3765\,cs) \qquad \text{II}$$

in which

B = Barometric pressure in inches of mercury;

c = Degree of saturation of the air expressed as a decimal;

s = Aqueous tension of saturation at the observed temperature, F.;

T = Absolute temperature in degrees F. = 460 + thermometer reading.

The value of c may be taken from the diagram, Fig. 1, or calculated by the following formula:

$$c = \frac{s_2 - \frac{B}{30}\left(\frac{t_1 - t_2}{88}\right)}{s_1} \qquad \text{III}$$

in which

t_1 = Reading of the dry-bulb thermometer exposed to the air current;

t_2 = Reading of wet-bulb thermometer exposed to the air current;

s_1 = Aqueous tension of saturation at temperature t_1;

s_2 = Aqueous tension of saturation at temperature t_2;

The values of s, s_1 and s_2 in the above formulas are taken from Table No. 1.

TABLE I. PRESSURE OF AQUEOUS VAPOR

Degrees F.	Barometric Pressure in Inches of Mercury, 32 Deg. F.	Pressure, Lb. per Sq.In.	Degrees F.	Barometric Pressure in Inches of Mercury, 32 Deg. F.	Pressure, Lb. per Sq.In.
— 30	0.0099	0.0049	62	0.5561	0.27[illegible]
— 20	0.0168	0.0082	64	0.5964	0.29[illegible]
— 10	0.0276	0.0136	66	0.6394	0.31[illegible]
0	0.0439	0.0216	68	0.6850	0.33[illegible]
5	0.0551	0.0271	70	0.7335	0.36[illegible]
10	0.0691	0.0339	72	0.7848	0.38[illegible]
15	0.0865	0.0425	74	0.8393	0.41[illegible]
20	0.1074	0.0527	76	0.8972	0.44[illegible]
26	0.1397	0.0686	78	0.9587	0.47[illegible]
32	0.1815	0.0891	80	1.0240	0.50[illegible]
34	0.1961	0.0963	82	1.0920	0.53[illegible]
36	0.2122	0.1042	84	1.1650	0.57[illegible]
38	0.2293	0.1126	86	1.2430	0.61[illegible]
40	0.2476	0.1216	88	1.3240	0.65[illegible]
42	0.2674	0.1313	90	1.4100	0.69[illegible]
44	0.2885	0.1417	95	1.6470	0.81[illegible]
46	0.3111	0.1528	100	1.9180	0.94[illegible]
48	0.3352	0.1646	110	2.5780	1.26[illegible]
50	0.3610	0.1773	120	3.4270	1.68[illegible]
52	0.3885	0.1908	140	5.8590	2.87[illegible]
54	0.4178	0.2052	160	9.6300	4.73[illegible]
56	0.4492	0.2206	180	15.2720	7.50[illegible]
58	0.4826	0.2370	200	23.4570	11.52[illegible]
60	0.5183	0.2545	212	29.9250	14.69[illegible]

An example will serve to illustrate the application of these formulas. Assume that: The quantity of air is 100,000 cu. ft. per min. = Q. The calculated velocity at inlet of fan is 1800 ft. per min. = 30 ft. per sec. = v. Static pressure at fan

inlet is 2 in. of water = i. Reading of dry-bulb thermometer = 80 deg. F. Reading of wet-bulb thermometer = 75 deg. F. Barometer reading = 29 in. Horsepower delivered to the fan = 60 horsepower.

From the diagram, it is seen that the degree of saturation of the air is 80 per cent., and, referring to Table No. 1, the value of s for a temperature of 80 deg. F is found to be 1.024. Using formula II,

$$d = \frac{1.3273}{460 + 80}(29 - 0.376^{s} \times 0.80 \times 1.024)$$

$$d = 0.0700 \text{ lb. per cu.ft.}$$

$$h = \frac{v^2}{2g} = \frac{900}{64.32} = 14 \text{ ft.}$$

$$dh = 0.07 \times 14 = 0.98 \text{ lb. per sq.ft.}$$

Static pressure = $5.2\,i = 5.2 \times 2 =$ 10.4 lb. per sq.ft.

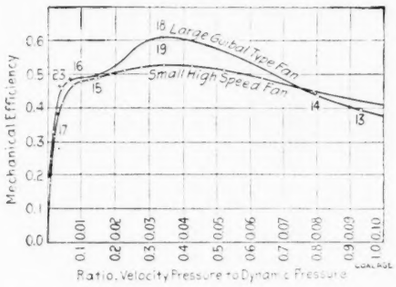

FIG. 2. EFFICIENCY CURVES FOR VARIOUS RATIOS OF VELOCITY AND DYNAMIC PRESSURE

Total pressure at inlet of fan = 10.4 + 0.98 = 11.38 lb. per sq.ft.

$$\text{Horsepower of the air} = \frac{11.38 \times 100{,}000}{33{,}000}$$

$$= 34.48 \text{ hp.}$$

$$\text{Mechanical efficiency} = \frac{34.48}{60} = 57.4\%$$

SELDOM NECESSARY TO CORRECT FOR MOISTURE

It is seldom necessary to go to the extreme of correcting for the moisture content of the air as in the above example. In this case the following formula for the weight of dry air may be employed:

$$d = \frac{1.3273\,B}{460 + t} \qquad \text{(IV)}$$

in which B is the barometer reading in inches of mercury and t is the temperature in deg. F. Or the formula,

$$d = \frac{p_a}{0.37\,T}$$

may be used, in which p_a = atmospheric pressure in lb. per sq.ft. and T = absolute temperature in degrees Fahrenheit.

POINT OF MAXIMUM EFFICIENCY

Every fan has some point of maximum mechanical efficiency. This can, however, be determined only by actual test. With fans of the same type or those having the same proportion of parts, the mechanical efficiency will in general be a maximum for approximately the same definite value of the ratio of the velocity pressure to the total pressure, and further, this efficiency will be fairly constant regardless of the speed of rotation. Generally speaking, the ratio of the velocity pressure to total pressure is greater at the point of maximum efficiency with short-bladed high-speed fans, than with fans having longer and fewer blades. This is difficult to explain unless it is because the short-bladed fan offers less resistance to the air at high velocities than one having long blades.

From the foregoing it is evident that with a fixed speed, a certain volume of air may be delivered which will give a maximum efficiency, and if a greater or less volume is discharged, due to decreasing or increasing the mine resistance, then the efficiency will be less. This shows the necessity of designing or choosing a fan to suit exactly the needs of the particular mine in regard to pressure and capacity, in order to get the best results from the standpoint of the cost of operation.

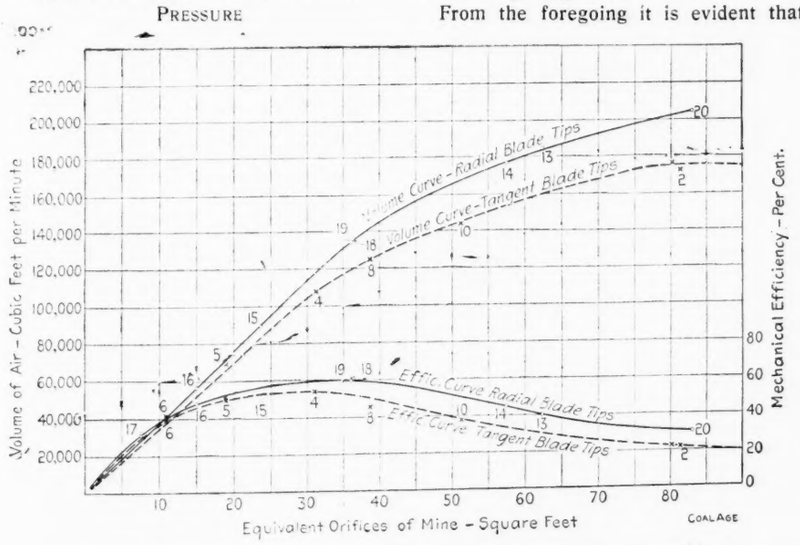
Volume Curve - Radial Blade Tips
Volume Curve - Tangent Blade Tips
Effic. Curve Radial Blade Tips
Effic. Curve Tangent Blade Tips
Volume of Air - Cubic Feet per Minute
Mechanical Efficiency - Per Cent.
Equivalent Orifices of Mine - Square Feet
COAL AGE

FIG. 3. VOLUME AND EFFICIENCY CURVES FOR VARIOUS VALUES OF MINE RESISTANCE

EFFICIENCY VARIES WITH VOLUME DISCHARGED

The variation of efficiency with delivery is illustrated in Figs. 2 and 3. In Fig. 2 the ratio of velocity pressure to dynamic pressure is plotted along the horizontal, and the mechanical efficiency along the vertical. The values for the lower curve are calculated from the operation of a small-size Sirocco fan. The curve shows that in this case the maximum mechanical efficiency is attained when the ratio of velocity pressure to dynamic pressure is about 0.38.

The curves of the diagram, Fig. 3, are plotted from the results of tests on an 18-ft. diameter, double-inlet exhaust fan, with blade tips either tangential or in a radial position. These curves show that the maximum efficiency is obtained for a certain definite value of the equivalent orifice, in this case, 36 sq.ft. The volume curves also show the falling off in the rate of increase of fan capacity after this value is exceeded.

The upper curve in Fig. 2 is plotted from the results of a test on this same 18-ft. fan, made when the tips of the fan blades were bent forward to a radial position. The velocity pressure, which has been calculated, is that at the inlet of the fan.

The mechanical efficiency of mine fans, when operating under the most favorable conditions, varies from 40 to 80 per cent. But high efficiencies are not everything; the most important consideration in regard to mine fans is reliability.

The volumetric efficiency of a fan is the ratio of the volume of air delivered per revolution to the cubical contents of the fan wheel. The volume per revolution is obtained by dividing the quantity of air delivered in cubic feet per minute by the number of revolutions per minute. The "cubical contents" of the fan is the total cubical contents, or that of a cylinder having a diameter equal to that of the fan wheel, and the same axial length.

The volumetric efficiency increases with the ratio of the velocity pressure to the total pressure, being a maximum when this ratio is 1, and a minimum when this ratio is zero, or the fan inlet or discharge is closed. In general, the value of this volumetric ratio is less for fans of large diameter than for those of small diameter. When operating at the point of highest mechanical efficiency, this ratio may often reach 2 to 2.5 for small-diameter, high-speed fans, while it may not go above 1 to 1½ for large fans, operating at comparatively slow rotative speeds.

A high volumetric efficiency in itself has but little value, unless accompanied by a good mechanical efficiency indicating a low fan resistance. Alone, the volumetric efficiency is an indication of the capacity as related to the size of the fan, and may be of value in determining the initial cost per unit of capacity.

Workmen's Accident Compensation

By A. Dinsmoor*

A brief résumé of the present status of workmen's compensation in this country. The author is of the opinion that there is necessity for prompt legislation in this direction as action for recovery in the courts has proved ineffective. Since other countries have had such laws in successful operation for a number of years, there seems to be no reasonable excuse for not adopting them in the United States.

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The appalling Cherry mine disaster* in 1909 led to legislation in Illinois so significant as to be of interest beyond, as well as within that commonwealth. As never fails in this country when a calamity of this extent occurs, relief was abundant and prompt. It came from the state legislature in an appropriation of $10,000, from the National Red Cross Society, from the Coal Operators' Association, from the State and International United Mine Workers, and from numerous other organizations, individuals and municipalities. A relief commission was created to manage the funds not immediately needed and to have the care and disbursement of the same in pensions for the benefit of the children of these miners.

A little later the fire prevention and appliance act was passed and three rescue stations were established in mining centers. At the same session of the Assembly a department of mining engineering was established in the State University.

Perhaps the most important of the less immediate results of the disaster was the appointment of the Employers' Liability Commission. This consisted of 12 members, six employers of labor and six workmen or representatives of labor organizations. The commission spent nearly the whole of the $10,000 appropriated by the legislature for its expenses; it investigated the history of hundreds of cases of accidents; consulted tables of statistics already gathered and collected many others, bringing together a mass of material of great value.

By the courtesy of a member of the commission I have had access to the report it presented to Governor Deneen and have gleaned from it facts bearing upon the subject of compensation to workmen in case of accidents, that are worth the consideration of all thoughtful citizens.

The most stable governments of Europe have arrived at decisions upon this subject which it behooves us to study. Germany has compulsory industrial insurance as a part of the paternalism that even the casual traveler observes as soon as he enters the Kaiser's domain. Every employer must insure with the government all his regular employees whose annual wage is less than $500. Each employee is a member of a trade assembly, into the treasury of which his employer pays a certain per cent. of his wages, dependent in amount upon the dangers of the occupation. In case of accident, the government insurance department provides surgical and hospital care and pays a monthly stipend during the workman's incapacity. In case of his death, it pays funeral expenses and pensions dependent members of his family. Employees receiving more than $500 annually have the responsibility of insuring themselves.

*267 men were killed, 167 women were widowed, and 382 dependent children were left fatherless.

In Russia, the employer is liable for all injuries to his work people except those due to their own fault. England has a system of workmen's compensation whereby, in case of accident, the liability is adjusted without taking the matter into the courts. Denmark has compulsory insurance laws and the employer includes the amount paid in premiums, in the cost of the production of his output. This system has been adopted in New Zealand along with its compulsory arbitration laws.

The Situation in Illinois

Nothing in the report of the Illinois commission is more significant than the comparison between the relief given to 50 of the Cherry mine families—$1800 each—and that given to 50 families bereft in ordinary accidents—$175.98 each. Surely, nothing could point more forcibly than these figures to the need of a change that would lead to the adoption of a more equitable and systematic plan for relief work in cases where one, two or six men are killed as well as when 50 or 100 men are lost.

The law's delays are proverbial and when, as is now constantly occurring, the adjustment of workmen's losses is through the mediation of lawyers, either with or without process of law, the delays are specially trying. A switchman whose leg was broken in 1905 recovered $200 in 1908. A steel worker blinded in an accident in 1907 recovered damages in 1910. A switchman who lost both legs in 1903 waited seven years for the award of damages.

The average amount of settlement, out of court, for the death of a miner, in Illinois, is $294; in 10 successful cases that were taken into court the families received a total net sum of $1021. But *more than 60 per cent. of the cases where miners are killed have no settlement either in or out of court.*

Operators of mines and other employers of labor recognize as plainly, if not as painfully as their employees, that compensation is due workers who lose life or limb in industrial accidents. Their difficulty is to get the money to pay the indemnities. Little as the workers realize it, employers are not always able to assume liability for losses that may come to their employees as the result of their employment. The industry is often carried on with capital borrowed at a high rate of interest. For months at a time the losses are often larger than the gains.

The Illinois commission found that about 50 per cent. of the accidents that occur are due to the fault of neither employer or employee, but to the "inherent" or natural hazard of the industry. Of the product of every industry—coal, steel, matches, white lead, or whatever it may be—the public has the benefit. These products minister to the comfort or luxury of the nation and the world at large. "Is it not fair," asks the commission, "that the public should pay such a price for each product that would enable employers to give fair compensation to employees or their families, who are the sufferers, in case of accident?"

Illustrating this question from the coal business in Illinois, the commission estimates that, allowing for an increase in accidents each year, $810,000 should be spent yearly in indemnities. On the basis of 50,000,000 tons of coal mined annually in Illinois, an addition to the cost of coal at the mine, of 1.6c. a ton would cover the sum needed as an indemnity fund for the state. This would certainly be a very simple and effective method of providing the money.

If the same method should be adopted by railroads, and all manufacturers and captains of industry generally, the cost of living might become what once would have seemed fabulous. There is, however, much to be said in favor of this tentative plan proposed by the commission and actually in operation, as I have said, in Denmark and New Zealand. With a fixed agreement between employer and employee as to the rate of indemnity to be paid in case of accident, the workman engages in any calling with his eyes open to the contingent circumstances in which he and his family may be placed. The kindness or inhumanity of an employer need not be considered, as he is obliged by law to provide the legal indemnity the case demands. The enormous cost of litigation now divided between lawyers and witnesses would be saved. Whatever money was dispensed would go *directly* and *without delay* to the injured man or his family. In cases

of great disasters, pressing needs could be met without appeal to labor or other organizations.

The present liability insurance companies supported by employers to carry their accident risks are very unsatisfactory in their operation, except it may be to the men who draw their salaries, in their administration. In 1908, $22,000,000 was paid into these societies, in premiums, by employers in the United States; and of this amount not more than $5,500,000 reached the workmen or the families for whose benefit these societies exist.

The Illinois commission, in the time allowed for its work, did not succeed in formulating a plan upon which a majority of its members could agree, and they therefore had no bill to present for legislative action. The whole matter is still unsettled, but the crystallization of public opinion is nearer at hand as the result of the investigations conducted.

Meantime, other states have been moving. Wisconsin, last year, enacted a law that has been approved by the Supreme Court; but, according to "La Follette's Magazine," it is not working, as was intended, owing to the great liability companies having done their best to circulate evil reports tending to discredit it among employers. These companies intend to live if they can, and so have raised their rates in Wisconsin, as they did in California and New Jersey, when workmen's compensation laws were enacted in those states. New York has recently adopted a limited compensation law that applies to hazardous trades only.

In an address delivered at the Industrial Welfare Conference in New York, in 1909, Mr. John Mitchell said: "It is not to our credit in America that more men are killed here in industrial pursuits, both in the aggregate and in proportion to the number employed, than in any other country in the world. In my own trade (mining) four men are killed in this country for each one killed in other countries; tomorrow not less than 20 men must die; every day the dawn breaks, from 10 to 20 men who enter the darkness of the mine return no more to their wives and loved ones. This is a problem—a living problem that cries aloud for solution." This cry, it would seem, would be greatly mitigated in every state, by the adoption of what might properly be called an automatic compensation law. The difficulties to be met in framing such a law ought to be overcome in a spirit of justice tempered by a sympathy worthy of our time.

Coal Convention in Cincinnati

The largest and most interesting gathering of coal men in the history of the Middle States took place at Cincinnati, Ohio, recently, when the Michigan-Ohio-Indiana Coal Association and the Southern Coal Dealers' Association held a joint meeting in the Queen City. The attendance was larger than ever before and the papers and discussions were along lines which were of great interest to the large number of coal dealers and jobbers who were fortunate enough to attend the meetings.

Combined with the meetings of the two coal associations was the annual "pow wow" of the Order of Kokoal. This attracted thousands of coal men from practically every state east of the Rocky Mountains. The "koruskation" of this order was one of the big events of the gathering.

Tuesday, June 11, was given up largely to the Kokoals. The opening session of the "pow wow" was held in the Sinton Hotel, with a large membership present. The address of welcome on behalf of Cincinnati was delivered by R. A. Coulter, while the address on behalf of the Kokoals of Ohio, Indiana and Michigan was given by J. E. Van Epps, of Cleveland. Felicitations from the tri-state association were extended by President Robert Lake, of Jackson, Mich., and from the Southern Coal Dealers' Association, by President W. T. C. Berlin. "Imperial Baronet" Arch Coleman, of Minneapolis, responded to the addresses of welcome on behalf of the Kokoals.

The annual report of Charles E. Lester, "imperial pictor," covered the main features of the work of the order during the past year, and was a most interesting document. "Imperial Modoc" Arthur M. Hull, of Chicago, in his annual address, took for his subject, "Kokoal's Past, Present and Future." Short talks were made by Charles F. Kerchner, of Baltimore; A. H. Beddoe, of St. Louis; Homer H. Allen, of Erie, Penn., and others.

The afternoon session was taken up with addresses by W. A. Clark, of Northhampton, Mass., president of the Retail Coal Dealers' Association, of the New England States; E. C. McMahon, of Knoxville, Tenn., and Charles K. Scull, of Philadelphia. Following the business session, the convention adjourned to meet at Chester Park, one of Cincinnati's pleasure resorts. Special trolley cars were provided for the occasion. The annual "koruskation" of the order, at which 75 candidates were initiated into its mysteries, was held here and a vaudeville show and numerous other amusements were provided for the occasion.

Officers selected by the Kokoals for the coming year are: C. R. Moriarity, Cincinnati, imperial baron; E. A. Wilson, Lowell, Mass., imperial baronel; L. S. Lawson, Memphis, imperial baronet; Charles E. Lester, New York, imperial pictor; Harry J. Heywood, Toledo, imperial mazumer; Dan Howard, Clarksburg, W. Va., imperial gazook; Thomas P. Jones, Pittsburgh, imperial pit boss; F. W. Saward, New York, imperial acolyte; A. L. Havens, Omaha, imperial swatta; Charles L. Crush, Louisville, imperial spotta.

The meetings of the coal associations proper were begun Wednesday morning, at the Sinton Hotel. The two organizations were welcomed by Mayor Hunt, of Cincinnati, on behalf of the city, and by C. R. Moriarity, on behalf of the coal men. Mr. Moriarity was chairman of the local committee on arrangements. After the responses by the presidents of the two associations, they separated and held separate sessions in different halls.

The annual address of President Robert Lake, of the tri-state association, was one of the features of the meeting. He outlined the growth of the association since its formation three years ago, and said that the membership at the present time was 1700. Secretary B. F. Nigh, of Columbus, submitted a lengthy report, which was favorably commented on by all who heard it. The report did not deal with what the association expected to do, but rather with what it had done in the past and the benefits which were derived from its activities.

A number of important papers were read at the meeting, among which was one by O. P. Gothlin, chairman of the Ohio Public Service Commission, who spoke on "Claims and Demurrages." He outlined the system to be followed in making claims against railroads and in fighting overcharges for demurrage. At the close of his address, he answered numerous questions relative to the work of the commission. George H. Barker, secretary of the Maynard Coal Co., of Columbus, made an address on "Benefits Shippers Derive from the Association."

Fred Bragans, of the Lorain Coal & Dock Co., of Columbus, told of the value of a smile in selling coal. H. M. Wilson, who is engineer in charge of the Bureau of Mines, at Pittsburgh, was another speaker. He told of the work of the bureau and the educational campaign which is being carried on with a view toward saving lives in the mines. J. R. Morehead, secretary of the National Federation of Retail Coal Merchants, made a plea for honest advertising.

At the sessions of the Southern Retail Coal Merchants' Association, the reports of President W. C. T. Berlin and Secretary Charles F. Roth were received, and a number of interesting papers were read during the two days.

Officers elected by the tri-state association for the coming year were: Robert Lake, of Jackson, Mich., president; W. A. Gibson, of Upper Sandusky, Ohio, treasurer; B. F. Nigh, of Columbus, Ohio, secretary; J. A. Ballard, of Detroit, vice-president.

Fourth Annual Meeting Mine Inspectors' Institute, U. S. A.

The fourth annual meeting of the Mine Inspectors' Institute of the United States of America was held in Columbus, Ohio, June 17-21. A large number of inspectors was in attendance from every coal-mining state and section, including British Columbia, Canada. The meeting of the executive board, Monday, was followed on Tuesday by the regular meeting of the institute, at which the members were welcomed by Gov. Judson Harmon, on behalf of the State of Ohio, and by Mayor George J. Karb, and J. E. Todd, president of the Chamber of Commerce, on behalf of the city. These addresses of welcome were followed by the annual address of the president, John Laing, chief of the department of mines, Charleston, W. Va. The president's address was full of interesting data and observations. He urged upon the institute the necessity of doing what they could to raise the general standard of wages in the country, and advocated higher wages for the inspectors themselves as a means of increasing the efficiency of the several state departments.

The president then appointed committees on Membership, Executive Business, Resolutions and Constitution.

At the afternoon session, following the reports of the secretary and treasurer, the institute was addressed by prominent men identified with the mining industry. Dr. J. A. Holmes, Director of the Federal Bureau of Mines, spoke on the necessity of coöperation between the federal bureau and the various state mining bureaus and departments. Dr. Holmes declared the Federal Bureau of Mines was founded for the purpose of aiding the several state mining bureaus. Former president, George Harrison, chief mine inspector, Columbus, Ohio, spoke briefly on the aims and purposes of the institute, and urged that the members devote their sessions to the earnest discussion of the many practical problems that arise in mining. Thomas Graham, chief mine inspector of the province of British Columbia, was present by invitation, and addressed the institute on the Miners' Liability Law of British Columbia. Mr. Graham recommended a similar law for every coal-mining state in the Union. Mr. Thomas Moses, former state mine inspector of Illinois, explained the Miners' Liability Law in Illinois. Mr. Moses stated this law in Illinois was not compulsory, but the employee can elect to come under the law or otherwise, as he may desire. Mr. Moses estimated the increased cost to mining, on account of the liability law, as 15c. per ton.

In the evening the institute held a banquet and smoker at the Great Southern Hotel, at which addresses were made by State Auditor Pullington, Clarence Hall, explosives expert, Bureau of Mines, Pittsburgh, Penn.; James W. Paul, Bureau of Mines, Pittsburgh, Penn., secretary of the institute; and James Taylor, state mine inspector, Peoria, Ill., and others.

Wednesday, the morning session was devoted to the reading and discussion of the following papers: "Quality and Quantity of Mine Air," by Karl F. Schoew; "A Suggestion In Regard To Coal Mine Inspection" was the subject of an interesting paper, by Dr. J. J. Rutledge, Bureau of Mines, Pittsburgh, Penn. Owing to the prolonged discussion of the previous paper, Dr. Rutledge's paper was read on the following morning, Thursday.

The institute was treated to an extended automobile ride through the city and suburbs on Wednesday afternoon, ending in a visit to the 5000-acre farm of Mr. Hartman, the inventor of Peruna. Here the members were refreshed with a tempting feast.

Thursday afternoon was devoted to an instructive visit to the plant of the Jeffrey Manufacturing Co. Special cars were provided, which carried the delegates from the Great Southern Hotel to the plant, which is situated along the line of the Big Four R.R., in the northern part of the city. A large delegation of the Jeffrey employees welcomed the visitors and conducted them through the plant, which was in full operation. The testing work in progress proved of great interest. One test in particular which attracted much attention was that of an 8-ft., double-inlet, blowing fan, which produced such a volume of air that none of the visitors were able to stand in front of the discharge. The accompanying photograph of the inspectors and guests was taken on the arrival of the visitors at the works.

Thursday evening a large banquet was given to the members of the institute and their friends in the banquet hall of the Southern Hotel. Over 100 members and invited guests sat down to the tables.

Friday morning, being the last session of the institute, was devoted to reports of committees and the election of officers. The following officers were elected for the coming year: T. K. Adams, Pennsylvania, president; D. J. Roderick, Pennsylvania, 1st vice-president; Edward Flynn, Alabama, 2d vice-president; D. C. Botting, Washington, 3d vice-president; J. W. Paul, Pennsylvania, secretary; R. S. Wheatley, Ohio, assistant secretary; J. T. Beard, New York, editor-in-chief.

The meeting was one of the most successful in the history of the institute.

GROUP OF MINE INSPECTORS AND THEIR FRIENDS VISITING THE COLUMBUS PLANT OF THE JEFFREY MANUFACTURING CO.

First row, sitting on ground, left to right: Thos. Moses, John Laing, Mrs. Laing, J. T. Beard.

Second row, sitting, left to right: Miss Devore, Miss Jenkins, Alexander Smith, Mrs. Smith, Frank Parsons, Mrs. Parsons, Miss Devore, Miss Smith, W. H. Miller, Mrs. Miller, Mrs. Moses, Mrs. Martin, Jas. Martin, Mrs. Henry, E. A. Henry, Mrs. Isaac Hill.

Third row, left to right: Robt. S. Wheatley, Edward Flyn, Thos. Graham, Thos. Hudson, Edw. Kennedy, John D. McDonald, Thos. S. Lowther, John Dunlop, Edward Boyle, J. W. Paul, Clarence Hall, D. J. Roderick, Mr. Roderick (Visitor), Geo. E. Sylvester, P. J. Moore, Isaac Hill, L. D. Devore, Mrs. Morrison, Thos. Morrison.

Fourth row, left to right: John F. Bell, Lot Jenkins, C. P. McGregor, Oscar Cartlidge, W. W. Williams, Thos. Little, Jas. Taylor, Martin Bolt, Chas. H. Nesbitt, Karl F. Schoew, R. Y. Muir, M. D. Daniel, W. W. Hall, Arthur Mitchell, Lance H. Holliday, James Hennessy, Thomas Wangler, Frank Haley, John Burke, D. T. Davis, Geo. Davis (Visitor), J. J. Rutledge.

The Hastings Explosion

An explosion occurred at the Hastings* mine of the Victor-American Fuel Co., about midnight of June 18. The accident cost the lives of 12 men.

The Hastings mine is one of the largest producers in Las Animas County and is located 16 miles north of Trinidad, Colo. Four hundred men are employed on the day shift in the old mine, which is adjacent to the new slope where the explosion took place. The old mine was not damaged, but fears of subsequent explosions were felt in the event that large quantities of gas would be forced into the main workings.

The new mine taps what is known as the "B" seam of coal which lies below the "A" seam, or old workings. The new slope branches off to the left from the old main slope a short distance from the mouth of the mine, and has been driven a distance of 4500 ft. The explosion is believed to have taken place near the face of the new workings. No concussion was felt even in the immediate vicinity of the mine, and the first warning of the disaster came when a night watchman saw smoke issuing from the mouth of the new slope shortly before midnight.

The Victor-American mine-rescue crew, working under the direction of David Reese, was on the ground soon after the explosion. This is a well trained and well equipped organization.

William J. Murray, vice-president and general manager of the mining department of the Victor-American Fuel Co., issued the following preliminary statement regarding the catastrophe, June 19:

We use nothing in this mine but permissible powder, which has been tested in every way conceivable by the government. The mine is regularly inspected and has always been found in a safe condition.

That the explosion should have been violent enough to kill 12 men—all but one of those working in that seam—is almost unbelievable. The men who were working in the upper seam, directly above the one in which the explosion occurred, say they did not know of the accident, the only intimation of it that they received being a sound similar to that of a shot going off. I have not heard how long it was after that noise that the explosion was discovered.

Six of the 12 men were taken from the mine dead. That leads us to believe that the seven others entombed in the workings are also dead. We have oxygen helmets at the mine and experts to use them. They are exploring every accessible part of the seam for bodies.

I have not received any detailed reports from the mine and will leave for Hastings at noon today to see what I can do toward relief work, and will start a thorough investigation into the conditions which caused the explosion. I do not believe for an instant that the explosion was purposely caused. We have had no trouble of any sort, nor has the mine any enemies.

*For a description of this mine see Coal Age, Feb. 24, 1912.

New Switchboard for Small Mining Plant

The equipment necessary for the control and distribution of electrical energy for small mining plants is usually simple, comparatively inexpensive, and, in general, similar to that employed for street-railway systems using direct-current generators for power.

Since one side of the system is grounded, the switching, protecting and measuring apparatus is reduced to a minimum, it being necessary to take care of the generator and feeder circuits of a single polarity only.

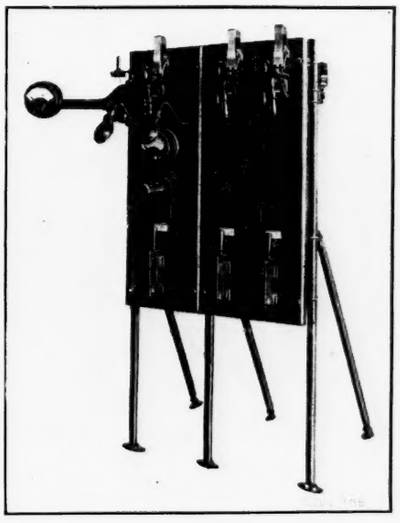


FIG. 1. SWITCHBOARD FOR STEARNS COAL & LUMBER CO.

However, to obtain safe and satisfactory service, there are a few features for which, if not absolutely essential, it is at least advisable to provide. The equipment should be of sturdy construction and good workmanship, and the panel supports should be insulated from the ground to lessen the chance of short circuits. The circuit breakers in the generator circuits should be connected between the negative brushes and the series field to protect the machines from grounds, either internal or between the machine and the panel.

The switching equipment should be such that when machines are run in multiple, the series field of the incoming machine may be connected in multiple with those of the running machines, and the voltage adjusted before closing the main switches, as this arrangement insures the correct polarity of the incoming machine and the least disturbance in paralleling.

All the foregoing points have been taken care of in the installation which the Stearns Coal & Lumber Co. made recently at its plant, at Beerthell, Ky. The switchboard for this operation was furnished by the General Electric Co., and is shown in the accompanying photograph, Fig. 1.

Often, too, at small mining plants, a separate source of power is not always available for operating the station and switchboard lamps. This is taken care of here by a lighting switch and fuses on each generator panel, using lamps of the same voltage as the generators or of lower voltage and connecting them in series. The lighting circuits are connected between the circuit breaker and the machine, and not at the busbar, so that the station can be lighted from any machine before the power is thrown on the line. This arrangement also prevents the station from being thrown in darkness should the breakers on all machines open.

Mining in a Steeply Inclined Seam

The two pictures shown on the front cover of our issue of last week, illustrate modern methods employed in winning coal from a steeply pitching seam. The pictures were taken in one of the mines of the Pacific Coast Coal Co., at Coal Creek, Wash. The coal vein here is inclined at an angle of about 38 degrees. The upper picture shows the method employed in this mine for cutting the coal, consisting of a Sullivan post puncher. The machine is driven by compressed air and is able either to mine horizontally or to make a shearing cut from the same set-up on the mounting. A radial motion is secured by means of a worm and gear segment, shown in the picture. The machine is shown mining in a dirt band near the top of the coal, which is about 4½ ft. in height. The lower picture on last week's front cover showed how the coal is removed from the mine. The pitch of the seam is so great that no loading is necessary, the coal when it is shot falls down the grade in chutes to a timber barrier or stopping, through which it is loaded into cars by means of small chutes or doors, after which it is hauled to the surface.

Secondary explosions, following in the wake of an explosive wave that has temporarily died away, are often due to red-hot floating globules of caked dust coming in contact with gas at the head of an entry or other closed place. In the majority of explosions the flame rarely fills the entry from side to side, but zig-zags along, more or less in the center of the entry, striking the walls only here and there. Dust explosions increase in violence as far as the dry, inflammable dust extends, but show little violence near the point of origin, unless due to the ignition of a considerable volume of methane or the discharge of a large quantity of explosives.

New Plant to Generate Power at the Mines for Commercial Distribution

The execution of a contract, recently, by the Lehigh Navigation Electric Co., of Philadelphia, with the General Electric Co., Schenectady, N. Y., is significant of the progress of active construction operations in connection with the largest electric-generating project in this country since the establishment of the Niagara Falls power plant. This contract calls for three 10,000 kv-a., 11,000-volt, 3-phase, 25-cycle complete horizontal turbo-generating units, with two 300 kw. turbo-exciter sets and one 300-kw. motor-generator exciter set to be installed at the Navigation Company's generating station at Hauto, Carbon County, Pennsylvania.

Preliminary reports of this proposed gigantic undertaking appeared in the technical and general press during the early part of last year, although a comprehensive scientific investigation of the commercial and engineering feasibility of the project had been in progress under the direction of the late W. A. Lathrop, president of the company, and Lewis B. Stillwell, consulting engineer, New York, since its inception in 1908.

Magnitude of the Project

This project for the centralization of power generation and distribution, involves an initial expenditure of $3,000,000 and definite plans for an eventual investment of $10,000,000, assuring a supply of 20,000 kilowatts from the first installation of the three 10,000-kw. turbo-generators and a gradual enlargement to 100,000 kilowatts ultimate capacity. Aside from the magnitude of the undertaking, it represents the beginning of the most novel and important step toward the economic use of coal and the economic generation of electrical power by means of fuel that has ever been taken in the United States.

Hauto, the site of the central generating station, is located about 10 miles west of Mauch Chunk, Penn., and is at the mouth of a railroad tunnel leading from the main body of anthracite coal owned by the Lehigh Coal & Navigation Co. at Lansford. From here the distribution of current for heat, light and power by means of high-voltage transmission lines, reaching out through eastern Pennsylvania and New Jersey, will penetrate a territory having about 2,500,000 population.

By transforming the effective force of coal into electric energy at the mines and transmitting this directly to consumers and industries, some of the biggest factors that enter into the cost of coal will be eliminated, namely, the charges for loading, transportation and unloading. The company figures that still another economic saving will be realized. At present, it has a waste product of about 500,000 tons of coal a year. This consists of coal particles which pass through $\frac{3}{32}$-in. round-mesh screens. All this culm is entirely unmarketable and will be burned under the company's boilers.

The location of the main generating plant at Hauto was determined largely because of an abundant water supply. An existing reservoir is being increased to a storage capacity of 1,000,000,000 gal. by the construction of a higher dam. The water-supply needs of the ultimate plant will be some 300,000,000 gal. a day, most of which will be carried back into the reservoirs after condensation. To run the plant up to the contemplated maximum of 100,000 kw. capacity, it is estimated that 1,000,000 tons of coal a year will be needed, a quantity which would require 20,000 of the largest cars made to transport it to market.

Among the first power consumers in the district will be the slate and cement industries in Lehigh and Northampton counties, all of which lie within a territory from 20 to 40 miles distant from the Hauto plant. Substations will probably be established at once at Coplay and Pen Argyl for stepping down and distributing the current. Within a radius of 50 to 75 miles from the main station, there are some twenty large cement mills. The transmission lines will be strung chiefly along the Lehigh Canal and on the right of way of the Lehigh & New England R.R., which the company controls.

The Cost of Power

A complete power census has been taken of the industries within the district which will be reached by the distribution system of the first section of the Hauto plant and it is found that over 100,000 hp. is being used now. The Lehigh Navigation Electric Co. has made up a schedule of prices, running from eight mills up to some two and a half cents per kilowatt-hour, according to the amount of power contracted for and the steady continuance of consumption, and in accordance with this schedule, the company will deliver its current quite materially under the price at which the industries are able to produce steam power.

With the exception of the 8000-kw. plant of the Harwood Electric Co., which supplies current for lighting and electric railway operation near Hazleton, Penn., and uses coal from its own mines, no attempt has been made heretofore in the coal regions of this country to generate electric current for public service. The Lehigh Navigation Electric Co. expects to have the first installation at the Hauto plant in operation before the end of the year. As the capacity of the plant is gradually increased, energy will be carried to Allentown and Easton, Penn., Trenton, N. J., and finally into Philadelphia. This latter city is within 80 miles of the plant, and New York is only 105 miles distant.

Coal in the Federated Malay States

During the year 1908, a Malay found pieces of black coal in the bed of a small stream near the south boundary of the Rantau Panjang forest reserve, in the state of Selangor; steps were taken for prospecting, which continued until May, 1910.

The geologist who reported early in 1911 on these coal measures states that the results of the operations carried out by the Mines Department show that the coal extends along the strike for more than half a mile. An examination of their records leads him to believe that there is another seam to the north of that exposed in the adit driven by the department, but as only one of the pits sunk and none of the bores have gone through the latter, there is no vertical section proving this; the one pit, which pierced the seam, passed through 24 ft. of coal and then entered into light-colored sandy ground. The geologist adds that it is clear from the evidence obtained in the adit that the seam at that point must be of great thickness, probably 50 feet.

Several analyses have been made of the coal and these show that it has a high percentage of moisture and is low in carbon and ash; this last, as pointed out by the geologist, is a good point, but the first two are the cause of the evaporation tests comparing so poorly with those of other coals.

The mean of five tests gave 9.8 as the evaporative value of one pound of fuel in pounds of water at 212 deg. F. This compares unfavorably with other coals, the percentage of which is given by the geologist as follows: Chinese anthracite, 12.4; Borneo coal, 14.4; Australian coal, 13.4; Indian coal, 13.2 and 13.6.

He also observes that the coal tested came from close to the surface and it is reasonable to expect that the quality will improve in depth. The discovery, too, of one seam of a certain quality does not preclude the possibility of further seams being found. The report is concluded with the words: "But poor though the coal may be compared with others, the determining factor that will fix its value as an asset to the country will be the price at which it can be sold, and the opinion of those in a position to judge seems to be that it will be possible to reduce the price sufficiently to counter-balance the high consumption that will be necessary to obtain the same results as with other coals."

A syndicate has been granted a prospecting license, and if hereafter a mining lease is desired, it will be granted.

Who's Who—in Coal Mining

Devoted to Brief Sketches of Prominent Men, Their Work and Ideas

When the college of "Hard Knocks" graduates a lad, and then a series of successes transforms him from a breaker-boy into a coal operator, there is always sure to be something about his makeup that stands out prominently and denotes in a large measure the secret of his rise.

Ploughboys have become presidents in these United States; office boys have advanced to be the heads of big railroads; thousands of humble but energetic lads have grown into manhood to become foremost in their professions. All have had a copious supply of the bitter before they were allowed to taste the sweet.

The breaker-boy who leaves this college of "Hard Knocks" as a fullfledged graduate, usually carries with him the conviction that honor and wealth only come through earnest toil, conscientious endeavor and an effervescent spirit of determination, which will not down and which cannot be smothered on the rocky road to success.

It is this spirit, fanned by its own energy and kindled with a fresh supply of the "do or die" fuel, that has given the anthracite coal fields one of its foremost mine operators, and the City of Scranton one of its biggest and most successful business men. He is Joseph J. Jermyn, who started life in the humble position of slate-picker, but who today is a man every inch of him, from the soles of his feet to the crown of his head.

JOSEPH J. JERMYN

STARTS AS BREAKER BOY

After his father, the late John Jermyn, crossed the Atlantic, and as a poor man located in Scranton, where he started to build the family fortune, the boy Joseph was born. He was like most of the other lads of the community. Early in life he was placed at work in the breaker, and in this lowly position he toiled as earnestly as he has done since then in many of his big business ventures. The spirit of the father was manifest in the son, and from the first day that the means of the father was sufficient to give the boy a start on a broader line of work, the lad applied himself with vigor to every proposition he undertook.

It was in West Scranton that Joseph Jermyn was born. In that same community he has remained throughout his life, and where the elder man built a fortune in mine enterprises, the son saw fit to use the same foundation for a successful career of similar nature.

When Joseph was very young the family moved to Rushdale, which has since been named Jermyn in honor of the father. At this place "J. J." went to work in a breaker, remaining in this capacity for several years.

When he was still a young man he began to battle with the larger questions in business life, and by the aid of his father became the owner of a colliery at Priceburg; from that time on his future was made.

A little later "J. J." acquired the Jermyn No. 1 and the Jermyn No. 2 collieries, of which he is now president and chief owner. His independent spirit was manifested only a short time ago, when the heads of big corporations negotiated with him for the sale of his properties, and he was forced to call off the deal because he did not believe credit in a financial way was being shown his efforts.

From the operation of coal mines he has turned to other business channels, although it is a difficult matter for him to keep from having close connection with all that pertains to the mining industry in its minutest detail. In Texas he is at the head of the Gulf, Texas and Western Railway. He is the sole spirit of this company, and while it is a matter that involves millions of dollars, he has clung to it, and at this time has 125 miles of road in operation, with the prospects bright for a rapid growth of lines within and without the state.

But aside from these activities, he has identified himself with other ventures, and has gained prominence as a banker, and is now the president of the Taylor National Bank at Taylor, Penn., and vice-president of the Traders National Bank in Scranton.

A few years ago, Mr. Jermyn became interested in a water supply venture, and before the people of Scranton were really aware of the big deal on which he was engaged, he had organized a company and was the chief owner of a works near Scranton, from which the supply for the city now mainly comes. This was one of his biggest undertakings and likewise one of his most successful. He was at the head of this company until about two years ago when the interests changed hands and millions of dollars were turned from the new company over to the retiring members.

At the present time, Mr. Jermyn finds much to interest him in the real-estate world, and the realty business of Scranton offers him an excellent field to work out his own theories. Much as the late Col. John Jacob Astor did in New York, "J. J." has gone in for many big deals, and through his keen insight and shrewd business judgment, several of the largest buildings in the busiest section of the city are today part of the Jermyn estate.

He has but one hobby, and that is fast horses. He does not care for the racing end of the sport, but does like to own and breed horses which do not eat the dust of others on the driveway. A few years ago he became so interested in the breeding of fast animals that he purchased a stock farm in New York state which in a short time became famous throughout the East. Unfortunately fire destroyed his buildings and most of his stock, and since that time he has given up breeding on a large scale, although there is no man living who has greater respect and love for thoroughbred equines than Mr. Jermyn.

One thing is striking of the man: He does not like the glare of the spot-light. He prefers to work when others don't know what he is doing, and his successes are secrets of his own. He neither seeks nor wants publicity and when it is thrust upon him, he gracefully submits. Mr. Jermyn is chief exponent of the old adage that "Silence is golden," and he firmly believes that "to persevere in your duty and be silent" is the best answer to calumny.

Current Coal Literature

The Best Thought Culled from Contemporary Technical Journals, Domestic and Foreign

New Coal Field in Kent, England

The "Monitor" of Boston makes the following interesting remarks on the coal newly found in the South of England. The county of Kent lies in the extreme southwest of England between the North Sea and the British Channel.

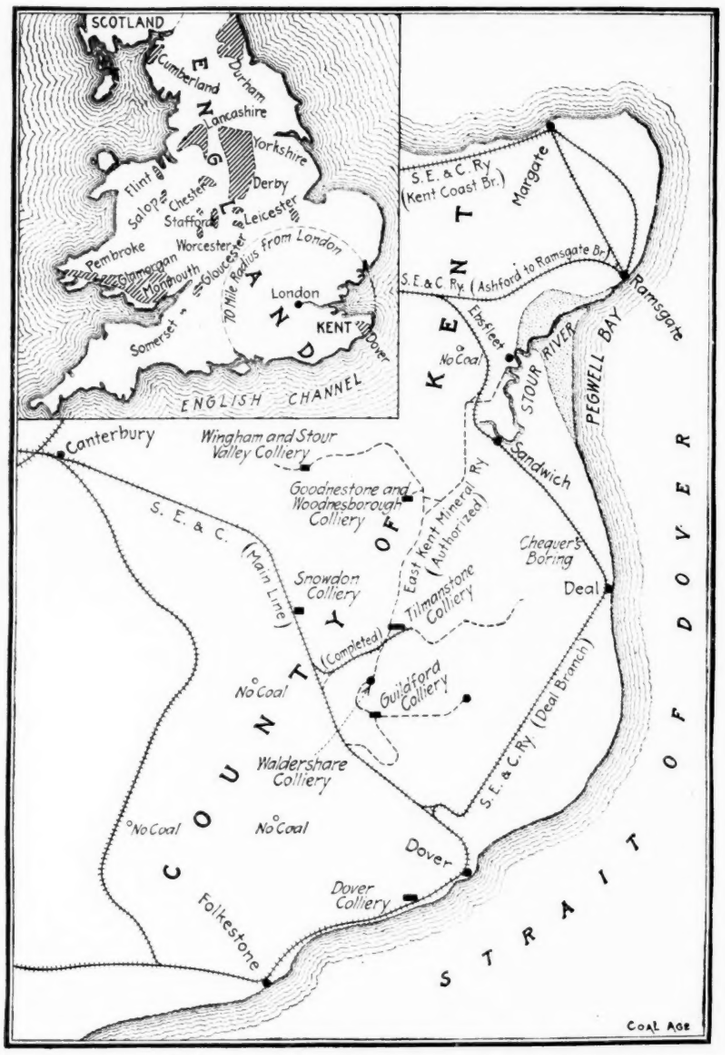
It is estimated that the Kentish coal field contains not less than 10,000,000,000 tons of coal, a quantity sufficient by itself to supply the total output of the United Kingdom for 37 years at the present rate of production.

This large deposit has been proved to lie almost wholly beneath the 150 square miles which would be enclosed by lines joining Dover, Canterbury and Sandwich, and while the superficial extent of the new coal field, so far as it has been proved by borings, is considerably less than that of many of the British fields, still in depth, quality, thickness of seams and other compensating advantages it challenges comparison even with the wealthy area of Durham or of South Wales.

Prognosticated by Geologists

Over 22 years ago the existence of coal measures in the neighborhood of Dover, long suspected as a result of the discovery of the Pas-de-Calais field in 1849, was proved by Sir Edward Watkin in a boring put down under his direction on the shore below Shakespeare cliff; but although this boring was followed by the sinking of two shafts at the same spot, and borings inland were put down, no further discoveries of value were made until the autumn of 1906, when under the direction of Arthur Burr the boring at Waldershare proved beds 1 ft. 6 in. and 5 ft. 2 in. thick. This success was soon followed by the cutting of the 4 ft. 4 in. seam at the Fredville boring, also drilled for Arthur Burr.

From that time onward each successive borehole has emphasized the wealth and importance of the field; no fewer than 111 beds were discovered by the end of February of this year, of which 74 were of two feet and over, with an average thickness of four feet four inches.



THE NEW KENT COAL FIELD, LYING ROUGHLY IN A TRIANGLE, THE NODES OF WHICH ARE CANTERBURY, DOVER AND SANDWICH

COMPARISON OF KENTISH AND OTHER COALS

State or County	Description or Location	Seam	B.t.u.	Ultimate Analysis Carbon	Ash
1. Kent, England	Goodnestone Boring	3 ft. 9 in.	15,482	89.72	1.55
2. Glamorgan, Wales	Clyne Valley Coll. Co.	Yankee	15,336	85.10	2.30
3. Fayette Co., W. Va.	Minden	Fire Creek	15,293	85.49	3.66
4. Kent, England	Goodnestone Boring	6 ft. 7 in.	15,241	88.85	3.01
5. West Virginia	Pocahontas	No. 3 bed	15,226	87.01	4.45
6. Glamorgan, Wales	Hills Plymouth Co., Ltd.	9 ft.	15,190	86.98	3.97
7. Kent, England	Woodnesborough Boring	3 ft. 9 in.	15,185	87.89	2.36
8. Fayette Co., W. Va.	Lawton	Quinnimont	15,124	85.07	5.45

It will be noted that the analyses given are ultimate so that the carbon commonly known as "fixed" is added to that contained in the volatile hydrocarbons.

Development of the Industry

At Tilmanstone three shafts are now 1140 ft. deep and the coal measures lie but 30 ft. further down. Shafts at Guilford and Snowdon collieries are also at an advanced stage of development, while at Dover colliery one shaft is already sunk to the coal, and mineral is expected to be hoisted from the latter, as also from Tilmanstone, during the present year.

The collieries at Snowdon and Guilford will probably produce coal in 1914.

while those at Wingham and Woodnesborough, where the surface equipment is in preparation, will be pushed on as soon as the last Kent railway, now under construction, reaches these localities.

It should be noted in connection with the extent of the Kentish coal field that many of the borings have failed to penetrate to the depth recognized as the limit for coal mining, namely, 4000 ft., so that it is practically certain that there are many beds further down still awaiting discovery.

High Calorific Value and Low Freight Rate

But not only is the coal proved to be there in large quantity, but its quality, also, has been found excellent. A reference to the table on page 1250 shows how the Kentish steam coals compare favorably with the most famous products of South Wales and West Virginia.

It may be mentioned, in regard to the table referred to, that very fey coals are to be found, the world over, which give on test a calorific value of over 15,000 B.t.u., a figure equivalent to 8333 Centigrade heat units.

The great importance of the Kentish coal field lies in its unique geographical position; it is 30 miles nearer to London than any other coal field, and could ship coal to that city for 43.4c. per short ton. London consumes 17,000,000 tons of coal each year, and as the average freight per ton from the coal fields in the north by rail is about $1.30, it will be seen that Kent must ultimately capture the greater part of this market.

Chief Asset Is the Steam Coal

But as we have seen, the chief asset of the Kentish coal field will undoubtediy be its steam coal. Heretofore many European nations have obtained supplies for their navies from South Wales, and the latter sends annually to ports in the Baltic and on the shores of the North Sea some 7,000,000 tons of coal. Owing to saving in freight charges, given similar quality in both cases, the Kentish field should supplant South Wales, at least in this portion of its export trade.

The fireclay which underlies many of the seams in Kent is another potential source of wealth; it has been found to be of excellent quality and perhaps Kent will rival Staffordshire as a producer of potteryware.

It has been suggested that Kent coal will one day supply electrical energy to London by direct electrical transmission. There would seem to be no reason why collieries 60 miles from the metropolis should not generate power for London, which would then lose its smoke and grime.

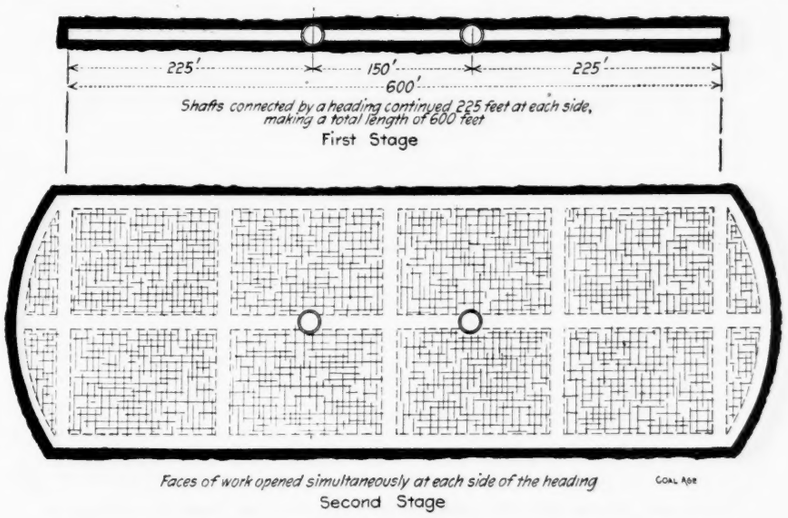
Paint is a good preservative for equipment anent which that old rule that a stitch in time saves nine applies fittingly.

Why Leave Shaft Pillars?

At the London meeting of the Institution of Mining Engineers, which took place June 6, 1912, W. H. and Basil Pickering delivered an address on the advisability of dispensing with shaft pillars. The contents of this paper will be given in brief:

We take it for granted (1) that the breaks due to the settlement of the strata are parallel with the face when it is reasonably straight and the longwall system is practiced. And (2) that the breaks caused by such workings are inclined toward the solid coal and reach the surface in advance of the working face.

The result of working the coal out completely by longwall without providing any pillars around the pit bottom is that the breaks all occur away from the shaft, but when the system of working is reversed and a large pillar is left, then the breaks occur just over the shaft pillar and are liable either to distort or otherwise injure the shaft.


225'
150'
225'
600'
Shafts connected by a heading continued 225 feet at each side, making a total length of 600 feet
First Stage
Faces of work opened simultaneously at each side of the heading
Second Stage

Opening Out a Longwall Face Without Leaving a Shaft Pillar

Compressive Strength of Shale and Coal

We could not find any records of the stress that shale and coal will bear under compression, therefore we had some made by the Sheffield Testing Works, Ltd., regarding the coal from the Barnsley seam and the shale, which usually forms the roof. This latter is so weak that it makes the working of the seam difficult.

Compression Tests of Barnsley Shales and Coals

Material Tested	Short Tons per Sq. Ft.	Effect
Shale from roof	47.47	Cracked generally
	47.47	Crushed
Softer coal	18.35	Cracked generally
	18.35	Crushed
Softer coal, better specimen	31.24	Cracked generally
	31.34	Crushed
Harder coal	86.99	Cracked generally
	92.35	Crushed

These results show that under compression the softer coal would crush first, then the shale above the bed, and finally the harder coal, which is stronger than either the shale or the soft fuel. This agrees with practical experience.

Molesworth quotes the crushing strength of limestone as 338 short tons per square foot, and of sandstone as 564 short tons. Unwin states that the Brodsworth limestone (which occurs above the coal measures in the Yorkshire coal field) will carry 330 short tons. This figure for the Ackworth rock (the strongest sandstone in the Yorkshire coal measures) is 356 tons.

Of course, one cannot rely on these observed strengths of rock in actual practice because of the weathering which takes place. Newly exposed strata tend to absorb oxygen, while firedamp and other gases escape from their surfaces. All the effects of this respiratory action are not yet clearly understood, but in most cases the adhesion of the material is reduced by exposure to air, and the atmospheric action is more powerful near the shaft bottom than further inby.

Size of Shaft Pillars

There have been a number of rules propounded for calculating shaft pillars, but the one usually regarded as best to use in answering examination questions is: "Leave pillars having a diameter equal to the depth of the shaft." The following table is taken from O'Donahue's Colliery Engineers' Pocket Book, and it is easy to see that the authorities are strangely at variance.

Shaft Pillars Required

Authority	Depth 600 Ft.	Depth, 1500 Ft.
Merwale	93 ft. square	150 ft. square
Andre	135 ft. square	315 ft. square
Wardle	180 ft. square	405 ft. square
Pamely	195 ft. square	420 ft. square
Foster	360 ft. diameter	570 ft. diameter
Lupton	399 ft. diameter	999 ft. diameter
Hughes	600 ft. diameter	1500 ft. diameter

It is interesting to note that Hughes' pillar for a 1500-ft. shaft would cover 80 times as large an area as Merivale's.

While recommending the extraction of the coal around the shafts as completely as in other parts of the mine, we do not urge that the packing shall be similarly constructed. Every care should be taken to secure the roof well near the shaft. The packing should be tight and as uniform as possible. It should be kept close to the working face.

No timber should be left in the packs or gob and the light packing should extend as far as a line drawn on the plan at a selected distance from all surface buildings containing engines, etc. The workings must be so arranged that the breaks in the roof shall not cross the shaft. The stones for the pack-walls should be selected carefully and sand or other fine material used to fill all spaces.

Four Methods of Extracting Coal Around Shafts

One method is to start at a point between the shafts and work out the coal in a gradually enlarging circle. Or headings may be driven to a specific distance and the coal can then be worked back to the shafts. Or again, the shafts can be taken as centers and the longwall extensions can be continued radially from them.

But none of these expedients seems desirable. If work is started between the shafts, it is almost certain that the "first break would occur before the shafts were reached." The breaks in the roof would reach back over the solid coal and seriously injure the shafts. If the workings were opened by headings and the pillar taken on a local retreating system, very serious damage would result from these breaks and there would be additional difficulty in keeping the roads and pit bottoms open during the operation.

If work were commenced from both shafts as centers, it would be difficult to extract the coal when both circles were gradually meeting and the breaks from No. 1 shaft would involve No. 2 and *vice versa*. We suggest that a heading be driven between the shafts and extended 225 ft., or some other selected distance on either side of the shafts. From this heading longwall faces could be started simultaneously along the whole length of the heading and on both sides of it. The sketch shown clearly marks out the general method but the manner of working and ventilating is entirely omitted.

All powder or other explosives kept in mines should be stored in boxes, kept tightly closed except when the miners are charging blasts or preparing cartridges. Such boxes should not be kept nearer than 100 ft. to any working face.

Rescue Stations in Scotland

The Fife and Clackmannan joint colliery rescue station, which has recently been opened at Cowdenbeath, is the first of its kind in Scotland. Some years ago the coal owners appointed a committee of representative coal men who visited different parts of England, where such stations were in operation, and made exhaustive and searching inquiries into the work done.

After careful consideration the committee framed a report, which was submitted to the coal owners in which they recommended the erection of a central station equipped with a certain number of apparatus, about 20, of which not less than 5 should be kept ready at every colliery; that at least 20 men in every colliery, including all the officials who know the mine, should be instructed in the construction and use of the apparatus; that an intelligent man should be placed in charge of the central station and that the apparatus designed by Mr. Gasforth should be adopted.

After discussion and deliberation, the coal owners proceeded to give practical effect to these recommendations, and on Nov. 4, 1910, a rescue station was formally opened. Since then, the training of men has been practically continuous, and at present there are, in the combined counties, 165 men who have been passed as fit and capable to undertake rescue and recovery work.

Description of the Station

The station staff consists of an instructor and an assistant, and the governing powers are vested in a general committee of the coal owners and an advisory committee of general managers. The station has been erected at Cowdenbeath as the most convenient center for the combined counties. It serves an area of approximately 390 square miles, with 91 collieries and 26,000 men and is linked up by telephone with all the collieries.

The building has been built at a cost of $7300 an additional $3900 being expended upon apparatus and equipment. The expenditure has been met by the Coal Owners' Association, and the cost of maintainance which amounts to nearly $9700 per annum, is being subscribed by the various collieries, the proportion in each case being based upon the output.

The main entrance to the building communicates with a drill hall measuring 24 ft. wide by 55 ft. long. The hall has an experimental gallery around three sides, which is 124 ft. long by 8 ft. wide, with a capacity of 9880 cu.ft. The partition dividing the hall from the gallery is glazed all around, so that the movements of the men under training may be observed by the instructor. Doors are conveniently placed in the partition, which can be immediately opened, so as to permit of the prompt exit to fresh air of any man who might happen to be overcome.

Instruction Given

One part of the gallery, termed the "nursery" has been made free from obstructions, so that the men can walk about without any trouble thus becoming accustomed to the artificial atmosphere before commencing to exert themselves. The other part of the gallery is arranged to represent, as nearly possible, the difficulties and obstacles likely to be met with in the damaged roadways of a mine after an explosition.

Smoke is led, by means of flues from a furnace chamber, into the gallery and caused to circulate through it by a small electrically-driven exhaust fan. By means of a draught-board, the atmosphere can be made so dense that the lamps of the men practising in the gallery can only be seen with difficulty through the inspection windows. Eventually a boiler will be erected, and pipes fitted round the gallery, to accustom the men to work in high temperatures; there is not only the danger and immediate risks to life consequent upon the presence of irrespirable gases, but also those attendant upon extremely high temperatures.

On the right of the main office is the instructor's office and house, and on the left the board room, men's dressing room, bathroom, repairing and apparatus room. A motor garage is situated at the rear of the main building. The building is heated with hot water pipes, and fitted with the latest sanitary appliances.

Firedamp Both Friend and Foe

A paper, by Wood and May, read before the North of England Mining Institute, brings out three interesting points, as follows: (1) The quantity of gas given off by a seam will be less where the cover is thin than where it is of considerable thickness. (2) But for the presence of firedamp at great pressure in the coal, in many cases the seams would be very expensive to win, so that we are presented with the following apparent inconsistency: (a) Firedamp is a source of danger to the miner; (b) firedamp by its pressure assists the miner. (3) In working a series of seams at different depths, great skill and sound judgment are required to retain the pressure of the confined firedamp in the separate seams during the course of working, so that the removal of one seam will not entirely eliminate the gas from the other.

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This journal is interested solely in matters relating to the fuel industries, and is designed to be a medium for the free interchange of ideas, the detailed description of coal-mining practice, and the expression of independent thought calculated to benefit both operator and miner.

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COAL AGE

The Exception which Proves the Rule

We print today in our Sociological department, an article of great value, written by Jonathan Wainwright and Henry Nichols, and though we find it impossible to indorse their conclusions, we think that the facts stated are of no little interest and contain more information than is at present available anywhere else.

The well known adage, declaring that exceptions prove the rule, never seems apt except in its application to infectious diseases. If such a disease is found to infect a single member of a family, or a body of workmen, and only that one member is so afflicted, we feel more confident in ascribing immunity to the other members so long as conditions remain equal. The one man, who was found harboring the ankylostoma, proves that the worm has had an opportunity to infest the anthracite regions. That it could not be found in other stools is a sign that conditions in those regions were not congenial.

As is pointed out in the article quoted, the ankylostoma has had every chance, except favoring temperatures, to become a resident and vote in the anthracite field. The Spanish war veterans have brought the American variety (*necator Americanus*) from the South, and the foreign miners have carried the European sub-species from the Old World. Yet of 400 men, only one, a Scranton man, had the European worm, and none had the American. Unfortunately, the identity of this Scrantonian is not known, but we venture to surmise that he was not a citizen, because the worm will hardly live more than four years, and eitizenship is granted to an alien in less than five, only when it is found that his judgment is greatly needed in the molding of public affairs.

One of the premises on which the authors base their fears of a coming hookworm scourge is the statement that the temperature of the anthracite mines lies between 77 and 104 deg. F., but it is likely that only in pump rooms could any high average temperature be found

It must be recalled that fecal matter is but rarely discharged in those parts of mines which are remote from the places where men are working and the air current is sluggish. The usual place is in rooms and returns, where temperatures rule lower than in less ventilated sections. In these latter, the cooling effect of ventilation is absent, and the heating action of the oxidation of the coal, and of the decay of props, materially raises the temperature of the still air.

If the figures for the range of temperature at which the worm will live are as Drs. Wainwright and Nichols have quoted them, then it is more clear than before that the ankylostoma cannot be our unwelcome guest. Conditions would be peculiarly favorable to its spread in anthracite mines because the timber sets of the batteries would become strewn with the worms and be spread on the hands of the climbing workman as efficiently as by the use of ladders.

The Dalcoath shaft, the English mine which was infected by hookworm and to which reference is made by Drs. Wainwright and Nichols, had its deepest working 2500 ft. deep in 1882. It has doubtless continued downward ever since, and the depth by this time must be considerable. The disease did not make its appearance at Dalcoath till the close of the past century. It is needless to point out how favorable the temperatures must have been for its spread. So that we cannot readily agree that Dalcoath conditions are similar to those in our own coal mines.

Douglas Bunting, chief engineer of the Lehigh and Wilkes-Barre Coal Co., says that in the mines operated by that concern temperatures range "from the temperature of the outside air up to 79 deg. *F.* The more usual temperatures, where there is no artificial heating or cooling, vary from 56 to 66 degrees.

F. M. Chase, vice-president of the Lehigh Valley Coal Co., says: "While we

have no actual data concerning temperatures in the deeper workings of our mines, I am satisfied that any temperatures as high as 100 deg. F. could not be confirmed. Frequently temperatures are affected by local conditions, as, for example, where second mining is going on, or where a creep or squeeze is in progress, but I do not recall any temperatures as high as 100 degrees.

We note that the range of temperature at which the ankylostoma thrives is placed by Wainwright and Nichols between 68 and 104 deg. F. Hertslet's report gives lower figures; viz., 57 to 87, and we are inclined to believe that these figures are too low. If the higher estimate gives the correct temperature at which incubation and the earlier ecdyses of the ankylostoma will take place, then it will be observed that the anthracite mines will only locally and partially meet the needs of the nematode.

The Siphon

Many people fail to realize that a siphon should be designed for the carriage of air as well as of water. The problem confronting us in siphoning is how to pass air through a pipe, and it is to be solved in the same way as one very like it, how to pass solids through a system of drainage. There are some engineers who take the position in each case that the safest plan is to extract the adventitious material rather than to transport it, for both air and dirt tend to separate and to oppose the flow of the water.

In drainage it is usual to form large settling chambers or catch basins, and for a while they serve the purpose well, but if too much detritus accumulates, the sewer line is stopped. Had no catch basins been built and had the pipes been continuous, the possibilities are that no detritus would have formed. The outrush of water would have taken care of the solids which it carried. Many are the catch basins installed, which are sources of annoyance and expense rather than of economies in operation.

And with a siphon, little is usually gained by allowing a collecting place for air.

It will be found much better in most cases to strive for a full water line which will sweep out the occluded and entrained air without loss.

Workmen's Compensation

In this issue we publish a brief synopsis of the situation at the present time as regards workmen's compensation in the United States, with special reference to the coal industry. This is indubitably one of the leading questions in the coal industry today, and one which our republican form of government has proved its inability to cope with successfully.

As our correspondent points out, the most stable of the European governments have long had laws of this nature in successful operation. While the fact that these laws have been tried and proved is in itself a strong recommendation for their adoption here, there are other reasons advanced even more conclusive.

Probably not the least of these is the fact that this can be handled at such a small cost. In the investigations conducted by the Employers' Liability Commission of Illinois it was found that a very satisfactory indemnity fund could be provided by the payment of 1.6c. per ton on all coal mined in the state. This commission also found that 50 per cent. of the accidents were due to the inherent or natural hazards of the industry, and since these hazards must be assumed by someone in order that the industrial development of the country may proceed, the people may be reasonably expected to provide the necessary relief.

Another and still more conclusive argument for the enactment of some such measures is the enormous expenses involved in handling these matters in the courts, and the long delays incident to such procedures.

That the beneficiaries of a miner's estate receive but a small proportion of the award in an action at law, is too well known to the mining fraternity to require further comment. And that such actions should be delayed, as the instances cited by our correspondent show, is highly reprehensible and deserving of prompt and vigorous legislative action in every state in the Union.

The most severe antagonism, that the various measures of this nature encounter is that emanating from the different liability insurance companies and those dependent upon them. That these should bitterly oppose the enactment of liability laws is not to be wondered at, however, when it is remembered, as our correspondent points out, that only about one-fourth of the amount paid into these companies ever reaches the victims of the accidents.

In fact a summary of the situation in the United States shows that only on rare occasions do the employees receive compensation commensurate with the extent of the injury sustained, that the present policy is unsatisfactory to each of the principals involved (the miner and operator) that by far the larger proportion of the moneys expended in this way goes to the support of the liability companies and in the payment of numerous and expensive attorneys' fees.

We are informed that the miners' compensation act in Illinois, is not compulsory; but the miners individually can elect to come under the law by signing an agreement with the company, or not, as they choose. The success of this rather tentative arrangement will be watched with interest.

The Roof over a Pillar

It is interesting to note how the Pickerings, in the article on "Why Leave Shaft Pillars," tacitly assume that every mining man in England is ready to grant that the roof over the pillar is not subject to strain, distortion and breakage, but will give way inevitably to those stresses.

We think that in this country the authors of that paper would have faced sardonic looks from the whole audience before the first paragraph of their interesting paper had been read, and we recall a writer who had temerity enough to express the same idea in Indiana County, Pennsylvania, about a year ago and was asked to produce proof for every statement he made.

The shipbuilders of England, years ago, thought that a boat should be constructed merely strong enough to resist water pressure. After a number of such iron tanks had gone mysteriously to the bottom, it was concluded that a ship in a storm, was a bridge or girder supported on one or two piers, known as waves. When the storm came, the bridge sometimes broke down over the piers and went to the bottom of the sea.

The roof of the mines is like the ship on the crests of the waves. We shall never understand mining conditions till we give the overburden of the coal a closer consideration than was bestowed by the early English designers on the iron ships of the middle of the last century.

Discussion by Readers

Comment, Criticism and Debate upon Previous Articles, and Letters from Practical Men

Gas Wells through Mine Workings

In reply to your request of May 20 for some information concerning the boring of gas wells through old mine workings in the bituminous regions of Pennsylvania, I wish to say that I have made some inquiries concerning the matter and find that the gas companies are engaged in drilling wells in several of the mine inspection districts, and that some of these wells penetrate abandoned portions of mines now being worked, and others pass through old workings of abandoned mines, adjacent to live workings of mines in operation.

The different coal companies and state mine inspectors who have supervision over mines affected by these drilling operations are quite naturally alarmed concerning the serious consequences which may result should the casing or tubing of a well which is producing large quantities of gas become damaged by the subsidence of the overlying strata or by the action of acid mine water in eating through the casing.

The coal operators are just as determined to protect the lives of their employees and their property from destruction as are the gas companies to secure the gas which may lie within the boundaries of their leases, and some of the consequent disputes have been taken to the courts for adjustment. There does not seem to be any law upon the statute books of this commonwealth to cover such questions satisfactorily, and one case, which has been in litigation for several months between the Greensboro Natural Gas Co. and the Penn Gas Coal Co. seems to be the one concerning which Mr. Roderick has made complaint to our attorney general, for the purpose of obtaining some action which will give relief to the coal companies and their employees.

CASE IN WESTMORELAND COUNTY

The well in question is located in the southwestern part of Westmoreland County, a few hundred feet north of the Youghiogheny River, where the Belle Vernon anticlinal begins to flatten out on its northern extremity. This anticlinal has been, and still is, a noted natural-gas producer. The Penn Gas Coal Co. operates a large coal mine a few hundred feet to the north of the location of this well. The well penetrates the abandoned workings of the No. 4 mine, about 100 ft. from the main entry, which is at present being used and maintained as an intake airway to the mine now in operation.

The two companies entered into an agreement a few years ago, whereby the gas company would protect the workings of the coal mine from any escape of gas which might take place, but in the drilling of this particular well it was found impossible to comply with the requirements of that contract and the gas company seemed determined to proceed with the drilling regardless of consequences. The coal company, being alarmed concerning the safety of its mine, appealed to the court of Westmoreland County for an injunction to restrain the gas company from drilling this well until the terms of their contract were complied with. For some reason, the court did not give the relief which was expected, and the gas company continued to drill. The coal company then appealed to Mr. Roderick, who has taken the action stated above.

It is to be hoped that legislation will be enacted which will give sufficient protection to the mine employees and to the coal companies. Something certainly should be done as soon as possible, as there is a greater area of abandoned workings being created every day, and the gas companies, in their desire to find productive fields, are driling through these abandoned workings in a great many places.

ARTHUR NEALE,
Inspector of Mines, Ninteenth Bituminous District of Pennsylvania.
Irwin, Penn.

Expansion Bit for Drilling Coal

There appeared in COAL AGE, May 18, p. 1050, an article on the above subject by "Miner," in which he invites a "good discussion" on the advantage of using this bit in mining; and asks for the experience of those who have used it. In reply I am glad to give my experience in the use of this bit, which I have tested thoroughly for several months.

When I made my holes with it, not a single shot blew out its tamping, either when using black powder or dynamite of high or low grade to charge the hole. I was always able to produce my quota of coal each day with less shot-holes than by the ordinary method of drilling. Also the enlargement of the hole at the inner end is a great benefit in the blasting of top and bottom rock where the rock is not unusually hard.

My honest opinion, from actual experience in mining, is that this expansion bit or reaming method of drilling affords the miner a greater earning power with a saving in bodily exertion. An important feature in blasting hard coal and one that is worthy of attention, is the concussion that follows every blast and the effect it produces both on the ventilation and the accumulated dust. In the ordinary method of blasting in mines, the report of the blast is quick and sharp and a considerable concussion is felt. But, in the use of the expansion bit, the report of the blast is deadened and the concussion of the air much diminished. It seems to me that this of itself is an advantage in mining coal.

If an explosive charge occupies 30 in., in a drill hole 1½ in. in diameter, the same charge will occupy only about 4 in. where the hole has been enlarged to 4 in. in diameter.

$$\left(\frac{1.5}{4}\right)^2 \times 30 = \left(\frac{3}{8}\right)^2 \times 30 = 4\tfrac{1}{4}\ in.$$

The charge is, therefore, much more concentrated in the coal; and there is not only less chance of the shot blowing its tamping but a far less proportion of energy will be expended on the air, under like conditions. I hope other readers will give their experience with this drill.

PRACTICAL MINER.
Mahanoy City, Penn.

Drawing Room Pillars

Referring to the question raised by Pennsylvania Fireboss, COAL AGE, May 25, p. 1086, in which he suggests that the rooms, in this case, should be widened outby instead of inby, the work in this case, being retreating; and in which he asks whether in drawing the pillar between rooms 30 and 29, the next pillar between rooms 29 and 28, would not be lost; I would say this would depend on the nature of the roof, floor and coal, and whether room 29 had caved when the last pillar was drawn.

There are many conditions to be considered before drawing pillars is commenced. This is especially true if the roof is very strong and the area of pillar drawing would be comparatively limited. In that case, a very dangerous weight would generally be thrown on the remaining pillars. It is very important to

work out the pillars in such a manner that no small stumps are left to be taken out last, because the increasing roof pressure will generally crush these stumps so badly that they cannot be recovered.

In our mine we are working No. 5 seam and we draw every pound of coal that can be gotten. I always advise that as soon as a room is driven up to its limit, the miner should turn around and draw back the pillar, beginning at the face of the room. In the case under discussion I would say that if the coal rises from room 29 to room 30, the drawing of the pillar between these rooms would be more likely to cause a cave in room 29 than if the seam lies flat. I would like to see further discussion of the question since the drawing of pillars is of great interest to us in Indiana.

JOHN SUTTON,
SECRETARY INDIANA MINING INSTITUTE.
West Terre Haute, Ind.

Booster and Tandem Fans

Letter No. 11—In your issue of May 25, discussion is invited as to the practicability of booster fans in the mine for the purpose of increasing the ventilating current. I herewith give you the result of a practical application of same in the No. 4 mine, of the Northwestern Improvement Co., at Red Lodge, Montana.

After a fire in this mine in June, 1907, in which eight lives were lost by carbon monoxide poisoning, a rearrangement of the air currents was discussed by the officials and put in effect.

The No. 4 fan was, at this time, located on the west air course and the air was conducted to the east air course by an overcast over the slope. A fire had been burning in the two upper east entries of this mine for about 12 years; this had been walled off from the slope air course by masonry stoppings from 2 to 6 ft. thick, which were reinforced from time to time. Occasionally the fire would eat its way out at the edges of the stoppings, which was a continual source of danger and expense and required constant vigilance to obviate the danger arising from contamination of the intake air.

One of the rearrangement plans was to build a bulkhead in the east air course below the fire zone, and bring the air across the slope below this bulkhead. The air was then to be split, both the Nos. 5 and 6 East entries receiving their alloted portions.

On account of a squeeze in the No. 5 East back, air for this entry was taken in the haulageway as far as No. 39 room, thence into the back entry and to the face. The return was out the haulageway or main entry to No. 67 room, and hence up this room to No. 4 East entry. There were about 56 rooms inside of No. 67 room and these were on 60-ft. centers. Altogether the distance down the slope, into face of back entry and out the main entry to No. 67 room, was about 14,000 ft. The length of No. 67 room to No. 4 East back entry, into which it was holed, was 500 ft.; into the face of this entry out the return and up the slope to surface was 6500 ft. more, making the total length of travel for the air current about 21,000 feet.

The slopes at this place are numbered the same as the seam in which they are driven. At the west air course of No. 2 slope, another force fan was placed and the air diverted down this slope by an automatic door; curtains between entries diverted sufficient air to supply the rooms and entries.

Nos. 2 and 4 slopes were connected by means of a rock tunnel driven in the hanging wall from No. 2 to No. 4. From the No. 4 East, in No. 4 seam, where this rock tunnel connected, a pair of new tunnels were driven through the foot wall of No. 4 seam to Nos. 5 and 6 seams. The No. 5 seam was ventilated by a current through one of these tunnels; the air was returned out the other and overcasted to No. 4 East back entry, thence out to slope and back to the surface.

At the point where the return of No. 2 fan entered the back entry of No. 4 East entry, the Nos. 2 and 5 air currents retarded the return of No. 4 fan. This was demonstrated by stopping No. 2 fan and allowing the No. 4 fan to run. A skip was taken off the upper side of No. 4 East back entry and a wing built with brattice cloth from the east side of the rock tunnel, shaping the return of No. 2 fan to act as blower. It was found that this aided, instead of retarded the return of No. 4 fan, and the success of this plan suggested the installation of a booster fan.

It was decided, therefore, to place a booster in the neck of No. 67 room. Two funnel-shaped doors were placed on either side of the fan with their narrow parts up the pitches. The doors were so hung that when the fan stopped on account of a short circuit, power being taken from trolley line, the doors would swing open and the current from No. 4 fan allowed free passage on both sides of the booster fan.

A rope was fastened to the doors and the opening of same would pull out a knife switch and make a contact, which caused a red light to be shown on the entry; the motorman or others passing would notice this and start the booster fan. The back pressure kept the doors closed during the time the booster fan was running.

Before these changes were made, the measurements at the top of No. 67 room were from 6000 to 7000 cu.ft. per min. With the building of the wing on the No. 2 fan return, the No. 4 current was increased to 10,000 cu.ft. per min., and with the booster fan installed, 14,000 cu.ft. per min. was obtained with no lessening of the Nos. 2 and 5 currents.

J. B. MCDERMOTT,
State Mine Inspector.
Helena, Mont.

Cage Keeps for a Small Tipple

An ingenious arrangement of cage keeps at the tipple of a small mine in southern Indiana, was recently brought to my attention. The device is illustrated in the accompanying sketch, Fig. 1.

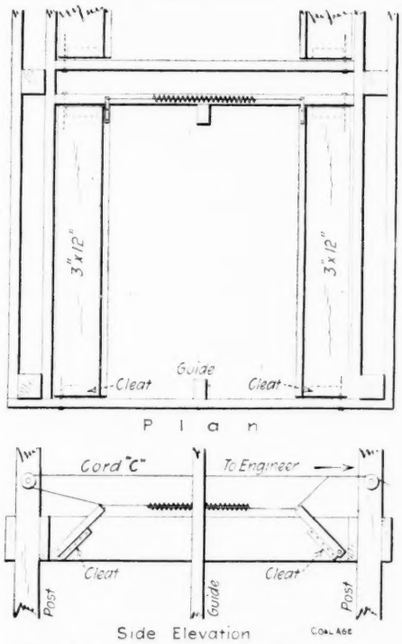


FIG. 1. CAGE KEEPS AND OPERATING MECHANISM

The keeps consist of two 3x12-in. planks, one at each end of the hoisting compartment. These are hinged to the side braces of the head frame by means of bolts. On the sides of the braces, cleats are nailed at such an angle that when the planks are in their forward position, for supporting the cage, the tracks of the cage and tipple are brought to the same level. A spring is employed to hold the keeps in the receiving position; and the ascending cage pushes them back until it passes the level of the floor, when the spring again pulls the planks inward against the cleats. The engineer then lowers the cage until it rests on the keeps.

When the empty car has returned to the cage, the engineer pulls the cord *C*, shown in the sketch, and the keeps are swung clear of the descending cage. This arrangement leaves the man in the tipple free to dump and weigh the coal without undue loss of time. The device can easily be made and installed by any of the men employed at a mine.

FRANK D. STEWART,
Mining Engineer.
Bicknell, Ind.

Examination Questions

Selected from State Examinations, or Suggested by Correspondents

Indiana Examinations Held at Terre Haute, Ind., May 21-22, 1912

(*Selected Questions*)

Ques.—What is an explosive?

Ans.—An explosive is a more or less stable, chemical, combustible compound, capable of undergoing a chemical change and producing thereby a large volume of expansive gases at a high temperature.*

Ques.—What is a "blownout shot?"

Ans.—A blownout shot is one that has blown its tapping, instead of breaking down the coal. In this case, the expansive force of the powder is wholly exerted on the mine air, producing an effect that may prove disastrous, especially if coal dust has been allowed to accumulate at the working face.

Ques.—What is a "tight shot?"

Ans.—A tight shot is one in which the charge is deeply embedded in the coal and not given sufficient opportunity to work or to break down the coal; in other words, the shot is tightly bound and the result is apt to be a blownout or, at the least, a windy shot.

Ques.—What is a "windy shot?"

Ans.—A windy shot is one having an overcharge of powder; that is to say, the charge is more than sufficient to break down the coal, and its surplus energy is expended on the mine air, producing a heavy concussion that blows open the mine doors in the vicinity of the blast and often does other damage. A windy shot, like a blownout shot, may produce disastrous results in the presence of dust accumulated at the face.

Ques.—What effect has a blownout, windy, or tight shot, in the presence of firedamp?

Ans.—Any of these shots would cause the ignition of the firedamp, and produce a gas explosion, which might develop into a mine explosion, depending on the conditions in relation to the gas and dust accumulated in the mine.

The occurrence of such shots, in the absence of gas and in the presence of coal dust, would result in the dust being blown into the air by the force of the blast. The suspended dust would then be ignited by the flame of the blast, producing thereby a dust explosion that would be propagated to a greater or less extent throughout the workings, depending on the conditions.

Ques.—What is the meaning of the term "dead hole?"

Ans.—A dead hole in blasting is one that is more or less perpendicular to the coal face, provided, of course, that the coal is not undercut or sheared. In a dead hole the charge has no opportunity to work or to free itself. The effect is similar to that of a tight shot, often producing a blownout or a windy shot.

In Fig. 1, the shots *a, b* and *d* are more or less perpendicular to the face. The shot *b* is a dead hole, since it has no opportunity to work. The other two shots, *a* and *d* can readily free themselves; the former is a rib shot, used to cut the rib of the opening, while the latter shot is side cut or sheared. The shot at *c*, often called a "grip shot," is inclined to the face of the coal.

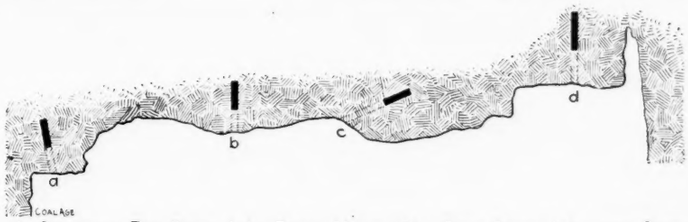


FIG. 1. SHOWING RIB SHOT (*a*); DEAD HOLE (*b*); GRIP SHOT (*c*); AND SHOT AND SIDECUT (*d*)

Ques.—Describe a well placed shot.

Ans.—When a shot is well placed, the line of least resistance does not coincide with the axis of the hole, and meets the face of the coal at a distance proportionate to the weight of charge. In blasting coal, the charge should be located as nearly as possible behind the center of gravity of the coal it is intended to dislodge. The charge should never be located too close to a hard boulder in the coal, or to a hard roof, or in a soft stratum of the seam itself. Much experience in blasting is required on the part of the miner in order to determine the position and the weight of charge required in any particular case. The hardness of the coal and the thickness and character of the seam must be carefully considered. In placing a shot, regard must also be had to the possible presence of any hard boulders, crevices in the coal, or the proximity of the charge to other drill holes, as well as to the character and hardness of the coal.

The several shots shown in Fig. 2 are all well placed, the position of each being adapted to the particular conditions in the coal seam. Lack of judgment in placing shots, in blasting coal, may produce a blownout or a windy shot with disastrous results, causing either a gas or dust explosion and possibly a mine explosion. A poorly placed shot may, at times, break the roof and cause a heavy fall that might have been prevented with the use of better judgment; or the same results may be produced by an overcharge of powder and the blowing out of the mine timbers at the face.

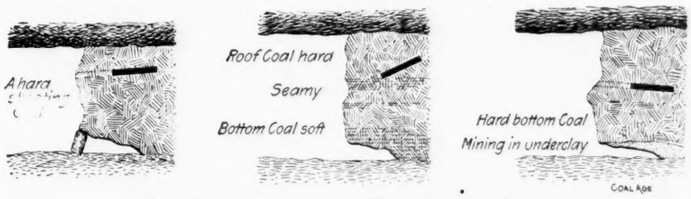


FIG. 2. SHOWING SOME WELL PLACED SHOTS

Ques.—If the main ditch in a mine is 24 in. wide, 18 in. deep and running full of water, at a uniform velocity of 5 ft. per sec., how many gallons of water is the mine producing in 24 hours?

Ans.—Assuming the velocity given is an average velocity for the entire cross-section of the ditch, the quantity of water discharged in 24 hours is

$$\frac{(24 \times 18)\, 5 \times 12 \times 60 \times 60 \times 24}{231}$$

$$= 9{,}694{,}753 \text{ gal.}$$

*The composition and properties of black powder and dynamite, together with the gases produced by the explosion of black powder, will be found on p. 489, Coal Age, Jan. 20, 1912. The explosion of black powder produces about one-third of its volume of solid ingredients, the remaining products of combustion being gaseous. The products of combustion of dynamite are all gaseous; they consist of the following: Carbon dioxide (CO_2), 37.2 per cent.; nitrous oxide (N_2O), 6.2 per cent.; nitrogen (N_2), 12.6 per cent.; and water vapor (H_2O), 44 per cent.

Sociological Department

For the Betterment of Living Conditions in Mining Communities

Hookworm Disease

By Jonathan M. Wainwright* and Henry J. Nichols†

It has been known for a number of years that there is a certain severe and widespread disease among European coal miners, known as miners' anemia, which is caused by the intestinal parasite, *Ankylostoma duodenale*, or hookworm. The disease is, therefore, communicable and in some mines has spread to 95 per cent. of the men employed.

So much has recently appeared in American medical literature on the general aspects of hookworm disease, its mode of spreading, and its symptomatology, that in the present contribution only those phases of the disease especially connected with mining will be taken up.

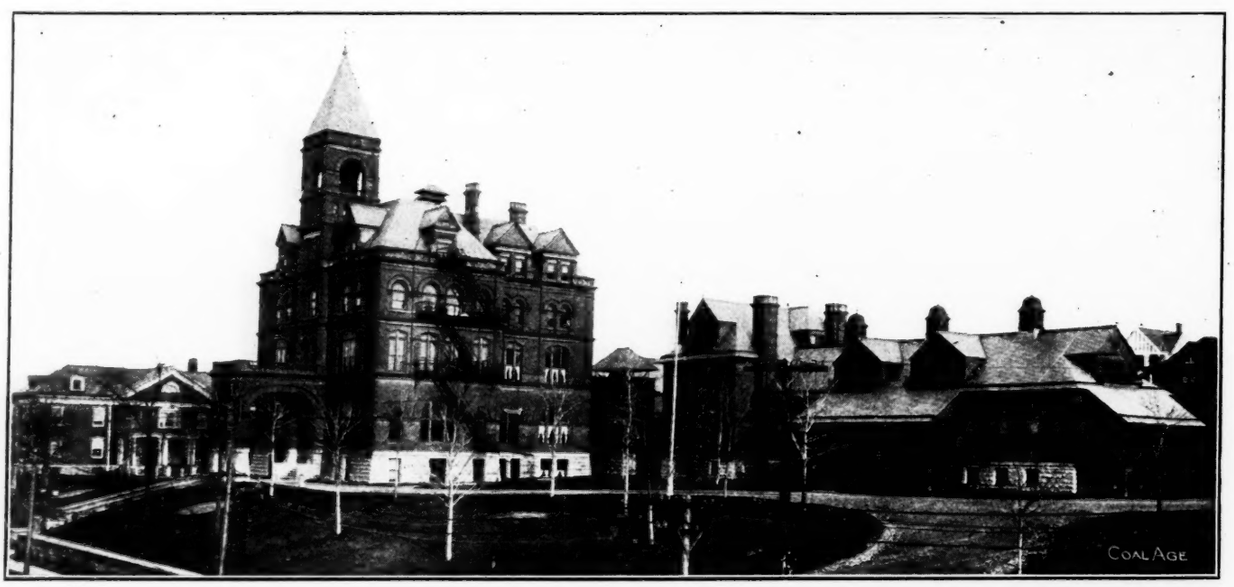
The Old World variety of the parasite was discovered in Italy, by Dubini, in 1843. A short time afterward, the worm was shown to be the cause of the so-called Egyptian chlorosis and, later still, to be the cause of an epidemic anemia in Brazil. The disease, however, did not attract much attention until work was begun on the St. Gothard tunnel. Here it was observed that the Italian workers in large numbers suffered from a disease marked by anemia and general debility, by which many were incapacitated for work. Perroncito and others investigating this malady found that it was due to this same parasite of Dubini and that the tunnel workers were infected with it to a very large degree. In a few years it was spread all over Italy by returning workers.

These Italian laborers are supposed to have carried the disease into the Hungarian coal mines. Here it spread until at present in some of the mines, as, for instance, in the Chemnitz district, 95 per cent. of the miners are infected. From Hungary, the disease spread to Germany. It is said that in the district of Westphalia there are about are about 25,000 miners affected. At a meeting of miners' representatives from all the coal-mining countries of Europe, held in Brussels in 1902, this subject was especially discussed by the German delegates, who claimed that, as the result of the ravages of this parasite, the average duration of a miner's life had fallen from forty-five to forty years since 1896.

Infection Travels North

From Germany, the disease is supposed to have reached Belgium. Romme[1] states that in Belgium the Institute Bacteriologique found that among 10,000 miners examined, 55 per cent. were infected. This affection has been so serious in Belgium that at Liège it has been found necessary to establish a special dispensary for the treatment of ankylostomiasis. This, with improved sanitary arrangements at the mines, has considerably reduced its prevalence in that country.

In France, the situation is a little less clear. Breton[2], of the Pasteur Institute of Lille, states that in the Loire basin 5 per cent. of the miners are infected, and at St. Etienne about 2 per cent. Breton further makes the interesting statement that Halle, in 1802, described an epidemic form of anemia among the miners at Anzin, France, which corresponds exactly to ankylostomiasis; this was attributed to bad ventilation. In 1875, a medical society in the Loire basin also investigated a form of anemia and came to a like conclusion. Riembault[3], too, writing in 1861, described a disease closely resembling ankylostomiasis which he called *anemia d'Anzin*, and considered to be epidemic. Breton believes that the extent of the disease in France was formerly much greater than at present, and that it has been reduced to the proportions he indicates. Recently, however, the French Service des Mines states, as a result of an inquiry of their own, that the disease is not present in the French mines. This conclusion



The Moses Taylor Hospital, at Scranton—Johnathan M. Wainwright, Chief Surgeon

Note—Reprint from the "Medical News." Studies from the clinical laboratory of Moses Taylor Hospital, Scranton, Penn.

*Chief surgeon, Moses Taylor Hospital, Scranton, Penn.

†University of Pennsylvania, now of Medical Corps of U. S. Army.

seems improbable and is discountenanced by Breton.

English Cases

In England, the situation is very interesting. Boycott and Haldane[4] have investigated a widespread form of anemia present in the Dolcoath mine, in Cornwall. These observers consider that practically all of the seven hundred underground workers are infected with ankylostoma. They found the ova in the stools of 38 out of 46 miners examined. They believe that the disease was introduced into the Dolcoath from the Colonies, probably South Africa, and that it has been spreading through the mine for about eight years. The Dolcoath is a metalliferous (tin) mine, but the physical conditions, so far as this worm is concerned, are practically the same as in coal mines. Thorough examination of other mines in England have not as yet been reported. Stockman[5] reports a case in a coal miner, in Lanarkshire, Scotland. This man had previously served two years in the army in India, and undoubtedly contracted the disease there.

The spread of this parasite through mining regions is easily accounted for by the life history of the worm itself and the sanitary conditions favoring it in practically all mines. The infectious material is, of course, fecal matter. This, in many cases, contains innumerable ova. When the fecal matter is deposited on the ground under favorable conditions, the ova develop into larvæ, which will infect men. These larvæ, when taken into the mouth, develop again into the adult organism. There are certain physical conditions for the development of the eggs which the mines supply most adequately. The eggs require a temperature of 68 to 104 deg. F. and a certain amount of moisture. Bruns[6] has shown that in German and Hungarian mines, where the underground temperature is from 77 to 86 deg. F., the disease is prevalent. In other mines, having a temperature of 66 to 68 deg., the disease is infrequent or entirely absent. The temperature of our anthracite mines generally ranges from 77 to 104 deg. F. The coal dust lying in the mines forms a good material for the growth of the worms. In fact, Goldman[7] and Loos, quoted by Goldman, used coal dust or charcoal to develop the ova experimentally.

Anthracite Mines as Incubators

The peculiar sanitary conditions which favor the spread of the parasite are these: None of the anthracite mines in this country and only a few coal mines in Europe, have any privy facilities under ground. The men deposit their excreta in any chamber or gangway handy. If any of the men have the disease, the eggs in their feces will develop, and another man stepping into this material will get some of the infectious larvæ on his boots and transmit them to his hands and then to his mouth. Or, a man can directly contaminate his hands while at work and easily transmit the larvæ to his food, especially if, as is often the case, the worker eats his dinner in the mine, without, of course, washing his hands. The man may not only infect himself in this way, but also take home the infectious material to his family, as has frequently been observed in Europe. In many of the European mines where ladders are still used to a considerable extent, the possibility of infection is even greater. A miner walking in infected fecal matter scrapes it off on the rounds of the ladder as he ascends and another miner directly soils his hands in climbing after him. In our anthracite mines, ladders are very seldom used, so that this one element of danger is not present. There is considerable evidence now that the larvæ sometimes gain entrance through the skin. If this mode of infection is possible, it is not the important one in the case of miners.

Found in Northern Cities

While several American clinical observers have described a form of anemia closely corresponding to that caused by this parasite, it was not until 1893 that Blickhelm first recognized the true nature of a case in the United States. From this time up to 1902, about 35 cases had been recorded, according to Stiles, in various parts of the United States, some being found in northern cities, such as Philadelphia, Albany, Buffalo, and St. Louis. It was not until 1902, however, that Charles Wardell Stiles,[8] of the United States Public Health and Marine Hospital Service, showed by a series of interesting observations that the disease is widespread in all our Southern States and that it is due to a different variety of the same parasite from that which causes the disease in Europe. This variety Stiles had discovered a short time previously and called *uncinaria americana*. Further reports now show that the disease is also widespread in Porto Rico, Cuba, the Philippines and Hawaii.

The wide extent of this disease, then, in foreign coal mines, in our Southern States, and in our insular possessions makes an inquiry as to its presence in our own coal mines of some importance. Stiles apparently first drew attention to the great economic meaning of this parasite which won for it in the lay press the somewhat significant title of the "bacillus of laziness." He showed how marked an influence this blood-sucking parasite must have on the productive power of a large portion of our Southern whites. This factor is already being felt in European mines and if this disease is present or threatens our coal mines its economic importance is great.

Migrations from the South

We have, then, a disease which tends to spread mainly through mines, and one which is already prevalent in countries from which many immigrants come directly to our coal mines. Further, we know that the disease is widespread in our own Southern States and that it is sometimes found, generally in imported cases, in our Northern cities. Sonsino, quoted by Perroncito, gives 50° 31′ north and 30° 05′ south latitude as the limits in which the disease may be found. Furthermore, it is prevalent in our islands and is frequently brought to us by returning soldiers. Garrison, Ransom, and Stevenson,[9] found the hookworm in 10 out of 59 examinations of returned Philippine soldiers. The same may be said of the soldiers returning from Porto Rico. Ashford and King[10] consider that 90 per cent. of the agricultural people and 50 per cent. of the city dwellers in Porto Rico have hookworm disease.

Goldman and Bruns have shown that the worms live in their human host for an average of six years, so that for this time every infected immigrant or returning soldier is a possible focus of infection.

It is evident, then, simply from this brief review of the literature on the subject, that, if this disease has not already spread among our coal mines, its introduction is only a question of time. Stiles has already found one case in a miner in South Carolina. This case, however, does not throw very much light on the disease as connected with mines as the worm is so generally distributed in this state.

Ova Found in Feces of Scranton Miner

In order to obtain some definite information on this subject, we have examined the stools of 400 anthracite mine workers. These specimens have been collected from such widely separaed cities as Scranton, Carbondale, Forest City, Pittston, Wilkes-Barre, Kingston, Sandy Run, Hazleton, and Lansford. At fifteen mines from 10 to 40 specimens were examined, while the rest were from single cases, as they were found in various miners' hospitals, and therefore widely scattered through many mines. The nationalities examined included all the mixed population found in our coal fields, i.e., Welsh, German, Hungarian, Italian, Russian and German Poles, Lithuanians, Magyars, Slavs, etc. The usual technic for this work was followed—ten cover slips being examined in every case before a negative finding was accepted.

Out of all this number (400) the hookworm ova were found only once. This case was a miner in Scranton, but, unfortunately, through a mistake in labels made by one of the miners, the man himself could not be traced. Stiles, who kindly examined this specimen for us, considered that the ova belonged to the Old World variety. Fifty other men were

examined at the same mine with negative results.

Another almost equally important finding was the larvæ of *Strongyloides intestinalis*, i.e., the organism of Cochin China diarrhea. This occurred in a native of Russian Poland in our own wards. He had been a farm-hand in the old country and had been in the United States only a few days before an accident brought him to the hospital so that the organism must have been imported with the patient. He was also infected with *Ascaris lumbricoides* and *Trichuris trichiuria*. He had no anemia or history of diarrhea. This is, so far as we can discover, the first time that either the hookworm or *Strongyloides intestinalis* has been found in the anthracite coal fields. Boggess found the ova in an Italian brickmaker, who had been working in the soft-coal fields of Pennsylvania for one month.

Other Parasitic Infections

The exact clinical and economic significance of *Strongyloides intestinalis* has not been made out. Perroncito[11] and others frequently found the organism among the workers at the St. Gothard tunnel, both alone and associated with *Ankylostoma duodenale*. Perroncito was of the opinion that the *Strongyloides intestinalis* could of itself produce an anemia. Thayer considers that this idea is disproven and that the parasite may, under certain circumstances, infest man with no harm, while, under other circumstances, it may cause a chronic, wasting diarrhea.

Our knowledge of *Strongyloides intestinalis* in the United States is limited. It was not until 1901 that Thayer[12] reported the first three cases found here. Moore described what he considered the fourth case in *American Medicine*, for May 30, 1903. Brown, however, had published an account of three other cases in the *Boston Medical and Surgical Journal* for May 28, 1903. During the year 1903, a number of other cases were reported in the United States, and it is very probable that the parasite is much more widespread than has formerly been considered the case.

It is of interest to note in passing that, among the 400 miners examined, we found 44 different parasitic infections, as follows:

Hookworm	1
Ascaris lumbricoides	15
Trichuris trichiuria	24
Oxyuris vermicularis	3
Strongyloides intestinalis	1
Total	44

Parasites in Hard Coal Mines

This infection was distributed among 37 individuals and in seven the ascaris and trichuris occurred together. This figure, about 10 per cent. of cases, is about the same as Garrison, Ransom and Stevenson found among soldiers before the Spanish War and is probably a fair average for a working population. The incidence of parasites, however, varies in different nationalities. Thus, of six Italians, railroad laborers at Scranton (not included in the above 400), all were found to harbor parasites, two having *Ascaris*, two having *Trichuris*, and two having both. Recently, an Italian in our wards was relieved of eight round worms and also contained the *Trichuris*. It is probable that, in general, infection with *Trichuris trichiuria* is slightly higher than here shown, as the ova are often very scarce. In some cases, we found only one or two ova in ten slides examined. The ova of the round worm on the other hand are generally so numerous as not to be easily overlooked. In one case we counted 49 round worm ova under a three-quarter inch cover glass. In our own hospital wards, containing as they do a very large foreign element, we can demonstrate a case or two of round or whipworm nearly any time we so desire.

So far, then, as this inquiry has gone, it would show that the hookworm has not obtained much foothold among our anthracite miners, although its presence to a certain extent is demonstrated. The material so far collected, however, does not allow of a definite knowledge of the facts. Hence a much wider search is being carried on. It is possible, of course, as the work progresses, that a single mine may be found, as the Dolcoath mine in England, where the disease has spread extensively and where remedial measures will be necessary.

A Ward in the Moses Taylor Hospital

Mine Mule as Source of Infection

One interesting finding in this connection is the fact that practically all the mine mules are infected with an organism so closely allied to the human parasite that it can be inferred from its constant presence in mules that our mines present favorable conditions for this family of worms. It is not probable that the mule organisms are transferable from the animals to men. We have not succeeded in infecting guinea-pigs with this worm from the mule, and we have examined the stools of 5 mine rats without finding anything except a variety of tapeworm.

In any event, the danger of this disease coming into our coal mines is great, and, when once established, its effect on diminishing the earning power and probably also in reducing the average length of life makes it an important question, for both miners and employers. However, no aid in keeping out the disease can be expected from the miners.

The only way probably by which the disease can be kept out of anthracite mines is, as has been suggested by Stiles, for either the State Bureau of Mines or Health to have the stools of newly employed miners carefully examined. The expense of this method will probably prevent its ever being employed as a distinctly prophylactic measure, though the serious economic loss to the state when the disease does become extensive would amply justify it.

We wish to thank Mr. Stiles for verifying our finding of the hookworm and *Strongyeoides intestinalis*.

[Acknowledgment is made to R. R. Phillips, general manager Delaware, Lackawanna & Western R.R. coal department, for the illustrations which accompany this article.—Editor.]

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Coal and Coke News

From Our Own Representatives in Various Important Mining Centers

Washington, D. C.

The Interstate Commerce Commission has issued an important order, calling for a complete investigation of anthracite-coal rates, which will cover the operations of some three hundred or more coal-carrying roads in the northern and eastern portions of the United States. This investigation will afford a means of inquiring into the reasons for the high price of anthracite coal and for the recent advance of approximately 25c. a ton in the retail price.

This action on the part of the Commerce Commission may take the place of the Congressional inquiry called for by the Difenderfer resolution, or if the latter is started, it will serve to aid and complete the investigation. This work has been planned for some time, but has been deferred, owing to the pressure of other undertakings. It has been pushed forward at the present time, owing to the general dissatisfaction with the coal situation. The order authorizing the inquiry is in part as follows:

> It appearing that the rates, practices, rules and regulations governing the transportation of anthracite coal have been the subject of formal and informal complaint to the commission.
>
> It is ordered, That an inquiry be, and the same hereby is, instituted by the Commission on its own motion into the rates, practices, rules and regulations of common carriers governing the transportation of anthracite coal from producing fields to all points in the United States east of the Mississippi River and north of the Ohio and Potomac Rivers, known as Official Classification territory, including domestic and export rates, and shipside or bunker coal rates to tidewater and lake ports.
>
> It is further ordered, That said inquiry shall ascertain whether the coal is mined or produced by or under the authority of common carriers engaged in the transportation thereof, or whether common carriers own in whole or in part any mine or mines producing anthracite coal which they transport or whether common carriers are directly or indirectly interested in any mine or mines producing anthracite coal which they transport.

Soft-coal Rates to Kansas and Nebraska Points

A recent opinion of the Interstate Commerce Commission is that rendered regarding the suspension of advances in freight rates for the transportation of soft coal in Kansas and Nebraska. This investigation was instituted to determine the propriety of an advance in rates from Springfield and southern Illinois mines to stations on the Missouri Pacific Ry. in Kansas and Nebraska, caused by the cancellation of joint rates and the application of combinations of intermediate rates resulting in higher charges. The proceedings grew out of a complaint received from coal operators at Christopher, Ill., on the Chicago, Burlington & Quincy R.R.

In passing upon the case, the commission says:

> To send traffic via the route dictated by the Missouri-Pacific would involve a material and unnecessary delay. In fact, it was testified that the delay would be more than a week. It is certainly not fair to the shipper to subject him to such a hardship and we do not think the route via East St. Louis reasonable and practicable. As to the proposed increased rates our opinion is that they have not been shown to be reasonable . . . . . and our finding is that the basis heretofore in effect should be restored; that is, a joint rate should be published applicable from the complainant's mine at Christopher to points of destination on the Missouri-Pacific in Kansas and Nebraska which will not exceed 40c. per ton above the current East St. Louis rate.

Alabama

Birmingham—The Republic Iron & Steel Co. is negotiating with the Palos Coal Co. for the purchase of the property of the latter company, which is now in operation. It is stated that details of the transfer will probably be completed by July 1, and that the Republic company will immediately start making extensive improvements at Palos, including a washer and coking plant, as the property includes a high grade of coking coal. The capacity of the mine is about 800 tons per day and the price agreed on is $300,000. The Palos company, it is understood, will retain a considerable acreage of undeveloped coal land.

The old Pocahontas mine, on the Frisco line, in Jefferson County, Alabama, has been reopened after being shut down for two years, and will soon be operating at its full capacity. This property was recently acquired by the American Coal Corporation. The Jagger vein is to be developed.

The court of chancery, at Trenton, N. J., on June 21, appointed the following receivers for the Alabama Consolidated Coal & Iron Co.: H. S. Matthews, of Birmingham, Ala., Halsey W. Barrett, of Newark, N. J., and Harry Coffin, of Harrison, N. J. The application for appointment of receivers was made by the American & British Manufacturing Co., of New York, alleging insolvency. The Alabama Consolidated Coal & Iron Co. has a capital stock of $750,000.

It is announced that the property of the Milner Coal & R.R. Co. will be sold at public auction in Birmingham, on July 1. The property consists of about 8000 acres of land, at Newcastle, in Jefferson County, Ala., 200 coke ovens, mining equipment and mining machinery sufficient for an output of 1000 tons of coal per day, a coal washer, miners' houses, railroad tracks, etc. The property will be sold free from all mortgages, liens, encumbrances and claims of any character.

Arkansas

Fort Smith—The property of the Union Anthracite Coal Co., of Jamestown, Ark., which was sold recently at public auction to foreclose a mortgage, was bought in by the trustee for the stockholders for $26,500. It is reported that the plant will be reopened again before long.

Colorado

Denver—Complaints against the Sante Fé railway regarding the increased rates on coal from the Walsenburg district of Colorado to points in western Kansas, will be heard before a representative of the Interstate Commerce Commission, in Denver, on July 3. The Kansas Public Utilities Commission will interest itself in the hearing with the idea of protecting Kansas coal users.

Trinidad—Twelve miners were killed and their bodies entombed as the result of an explosion at the Hastings mine, of the Victor American Fuel Co., shortly after midnight, July 19. The mine is located 16 miles north of Trinidad, and the explosion occurred in a new slope of the mine, 4500 ft. from the mouth of the shaft, where development work was in progress. The men were employed on the night shift in connection with this development work as shotfirers and entrymen. One of the number was rescued alive, badly injured. The entries in which the explosion took place were badly caved and it was some time before the force of rescuers, which had been summoned from neighboring collieries, could locate the bodies of the victims. The Hasting mine

is one of the largest of the southern Colorado field. Fire did not result from the explosion, and the main portion of the mine has not been damaged.

Illinois

Shiloh—The Aluminum Ore Co., of East St. Louis, owners of the proposed Denverside Connecting Ry., which, it is rumored, will be the nucleus of the new coal-carrying road from the inner district to the St. Louis market in connection with the new municipal bridge, has acquired options on several thousand acres of coal land in what is known as the Shiloh Valley, near this place, and extending toward Tilden, in Randolph County.

Mt. Carmel—It is reported that the Coal Hill Coal Co., of Terre Haute, Ind., has secured options on about 10,000 acres of coal land in Lawrence County, near Allison and Lawrence, and that preparations are being made to put down a number of test holes with the idea of an early development of the property.

Decatur—The Illinois Midland Coal Co. recently purchased sixty acres of ground in South Fork Township, and it is reported that the company will sink another shaft on the property. The new purchase lies midway between Sicily and Kincaid, where the company is developing a new mine.

Marissa—The Nelson Morris Co., of Chicago and East St. Louis, recently acquired options on over 1000 acres of coal land near here. It is understood that this property will probably be developed within the next year.

Indiana

Brazil—Miners in District No. 8 have referred to President John P. White the question of demanding extra pay for the cagers, and will await word from him before taking action. The work of the cagers is such that they have to start before the miners in the morning and wait until the last cage is up in the evening, which usually means considerably more than an eight-hour day. They are demanding that they be given either an eight-hour day or pay for the extra time which they put in. The question was first brought up at the Merry mine, of the Otter Creek Coal Company.

Linton—The Monon Coal Co. recently purchased the Little Giant and Clover Leaf mines, near here, the price paid being $500,000.

Indianapolis—After two conferences, June 18, members of the executive committee of the Indiana Coal Operators' Association and of the mine workers' organization announced that they were unable to agree on a method for settling the labor disputes at the mine of the Vivian Mining Co., at Jasonville, Greene County, and at the Sunflower mine, of the Dugger Coal Co., at Dugger, Ind., and adjourned indefinitely. About 400 miners are affected. The questions involved are the removal of slate and water.

Parkersburg—A strike was called recently at the stripping operations, near Bowling Green, in Clay County. The operators and miners seem to be unable to effect a settlement. An attempt has been made to import foreign laborers and the union men have met this contingency by persuading the newcomers to return to their homes.

Iowa

Knoxville—A new town, as yet unnamed, is coming rapidly into existence about 4½ miles southeast of here, near the operations of the Anderson Coal Co., which is making a second mine opening in that vicinity. Fifty houses are being moved from the Everist camp, and 100 to 125 houses are to be erected at the new site by Sept. 1.

Kentucky

Whitesburg—The Wentz interests, of Philadelphia, are negotiating for a tract of several thousand acres of coal land near the headwaters of the Cumberland River, just across the state line from their operations, at Stonega, Va., and it is said that development of the property will begin at once, if the deal goes through.

Hazard—J. T. Moore and John Gorman, prominent operators of the Jellico, Tenn., district, have leased the coal property of John & Johnson, and will install a large mining plant. They expect to have an initial output of 250,000 tons a year, and shipments may be begun in the near future, as the extension of the Lexington & Eastern R.R., which has been under construction for some time, is completed as far as Hazard. Regular service will begin, it is thought, by July 1. The extension is now being pushed on to Whitesburg, Letcher County, where it will terminate.

The Lost Creek Coal Co., composed of capitalists of central and eastern Kentucky, has transferred its large mineral holdings on Lost Creek and its tributaries to the Haley Coal Co., of West Virginia. The various tracts in this transfer total about 7000 acres and contain some of the richest coal lands in eastern Kentucky. It will be necessary, however, to install a branch line of the present Lexington & Eastern R.R. in order to operate the property.

J. L. Oldham, of Bath County, has leased 350 acres of coal land, 2 miles below Hazard, and expects to begin operations at once. The property contains one 5-ft. seam of coal and other workable veins. The terms of the lease specify a royalty of 10c. a ton with an annual minimum of $1200.

Winchester—Work has been begun on the extension of the Louisville & Nashville R.R. from Winchester to Irvine, Ky., a distance of 28 miles. Much new coal territory will be opened up by the extension. It is understood that the Louisville & Nashville will build a line to connect with the extension of the Carolina, Clinchfield & Ohio, which is being built across the mountains from Virginia into the eastern Kentucky fields. When these two lines meet, the Louisville & Nashville will have the outlet to the Atlantic Ocean that it has been striving to obtain for many years.

Missouri

Moberly—The Higbee Block Coal Co., of Higbee, Mo., was sold recently at receiver's sale for $55,000. The sale included a large tract of rich coal land, valuable mining equipment and other property.

Princeton—Drilling operations in search of coal near Saline were recently stopped at a depth of 600 ft. A 32-in. seam was disclosed, but the prospectors were disappointed in not finding the large Cainsville vein. Other holes will be sunk in hope of striking the thicker seam.

Ohio

Zanesville—About forty representatives of the operators and miners of the Crooksville-Zanesville district met at Zanesville recently in an effort to settle wage-scale differences for that region. The miners ask for some concessions to fit the local mining conditions. It was believed that it would take a week to work out details of the agreement.

Columbus—Interesting testimony was adduced in the federal court here recently at the hearing of the suit for $250,000 damages brought by the New York Coal Co. against the Hocking Valley R.R. Co. and the Toledo & Ohio Central R.R. Co. The plaintiff alleged that the two railroads named, discriminated in favor of the Continental Coal Co. in the matter of building switches and giving a car supply.

Hamden—It is reported that Jerry Morrow, of the Morrow Manufacturing Co. and Wellston Colliery Co., has succeeded in interesting Eastern capital in the much discussed coal land lying north of here in Richmond and Jackson townships. Five drillings are to be made on the property and if the results are satisfactory, a branch of the Columbus & Southern R.R. is to be arranged for, in order to get the output to market.

New Straitsville—The Essex mine at Colgate, near here, has been placed in operation again after a shutdown of several weeks following an accident to the generator. Work is progressing rapidly toward getting the New Hanna-Essex mine, on the Zanesville & Western R.R.

near Shawnee, in operation. There is a large acreage of coal land at that point and two openings are being made. It is expected that the operation will be completed in about two months.

Salem—The Buckeye Coal & Clay Co., of New Salisbury, will resume operations within the next few weeks after being idle for some time. A meeting of the stockholders was held recently to make arrangements for starting up the mine at once.

Pennsylvania

BITUMINOUS

Pittsburgh—Further reductions in the freight rates on bituminous coal from the Pittsburgh district to Great Lakes ports were denied, June 21, by the Interstate Commerce Commission. The Pittsburgh Coal Co. and John W. Boileau had sought further reduction from the commission's order of Mar. 11, which granted a reduction from 88c. to 78c. a ton on coal to Ashtabula.

It is reported that the Pittsburgh Coal Co. is now operating more mines than at any previous time in its history. This activity is the result of heavy shipments to the Lakes.

Brownsville—The $1,000,000 plant of the Crucible Coal Co., located at Crucible, two miles south of Rices' Landing in Green County, is now nearly completed. The Crucible Coal Co. was organized about a year and a half ago and owns 1400 acres of coal land and about 200 acres of surface at this point. It is said that the plant will have a capacity of 2000 tons daily. The output will be shipped to Midland in Beaver County, where 200 coke ovens have been erected and an additional 200 ovens will be constructed in the near future. Shipping will be done by the Monongahela River when possible, but a branch of the Pennsylvania R.R. is to be extended south of Rices' Landing at an early date in order to give the property a rail outlet.

Ebensburg—The Ebensburg Coal Co. is taking options on about 5000 acres of coal land near here, and the Buffalo, Rochester & Pittsburgh company is also securing options on land in this vicinity.

Johnstown—The Shoemaker Coal Co., with operations at Benscreek, has purchased the mine known as No. 2 from the Pennsylvania Coal & Coke Corporation. A number of improvements are being made by the Shoemaker company and it is expected that operation will begin within several weeks.

Greensburg—The property of the Hamilton Coal Mining Co., in Lower Burrell Township, Westmoreland County, was sold recently for $44,000.

Waynesburg—The Guarantee Title & Trust Co., of Pittsburgh, was recently given a verdict of $362,500 against the Dilworth Coal Co. Action was started by the trust company in order to determine the validity of a $300,000 bond issue that was floated by the Dilworth Coal Co. ten years ago.

Altoona—The coal business continues dull in the Cambria field and a large number of mines have been shut down for want of orders. The mines at Beaverdale are practically shut down, those on the Blacklick are running but poorly and mine No. 33 of the Pennsylvania Coal & Coke Corporation at Patton was recently closed. A revival of activity is looked for within a month or so, but not before then.

ANTHRACITE

Pittston—The Erie company is planning to strip a large area west of Hamtown. The coal lies quite close to the surface at this point.

Scranton—The new mine law, providing that all structures within anthracite mines must be of fireproof construction, went into practical effect on June 15. The act was signed one year ago by Governor Tener, to take effect six months from date, but provided for a six months' extension of time to allow for meeting with its requirements. The time limit has now expired and a heavy fine may be imposed on any deliquent company. Moreover, the foreman of the mine is liable to a jail sentence.

The Marian Coal Co.'s case against the Lackawanna R.R., which figured prominently in the Archbald impeachment hearing, was decided, June 21, by the Interstate Commerce Commission in favor of the coal company. The commission held that the rates charged by the Lackawanna R.R. for transporting anthracite coal from Taylor, Penn., to tidewater at Hoboken, N. J., were unreasonably high and ordered reductions ranging from 19c. to 25c. per ton.

Pottsville—Five members of the board of city trusts, in charge of the operations of the Girard estate, visited the Schuylkill Valley recently for the purpose of going over with the engineers a project for mining a large area of coal which is at present inaccessible because of reservoirs on the surface. The plan involves the establishment of new reservoirs which will probably mean increasing the capitalization of the company about $3,000,000. The board now has the proposition under advisement.

Rhode Island

Portsmouth—Operations have been resumed at the property of the Portsmouth Coal Co., formerly the Rhode Island Coal Co. It is understood that a considerable amount of additional capital has been interested in the property and that development will now be carried on to a point where economical operation will follow.

Tennessee

Chattanooga—It was recently announced by C. H. Smith, vice-president and general manager of the Durham Coal & Iron Co., that the 22,000 acres of coal land recently purchased by a syndicate, of which Mr. Smith is a member, will be worked in connection with the property of the Durham Coal & Iron Co. B. F. Bush, president of the Missouri-Pacific R.R., and Winslow S. Pierce, chairman of the board of directors of the Western Maryland Ry. Co., are prominently identified with the new syndicate.

The Durham Coal & Iron Co. has secured the right to operate the coke ovens of the Tennessee Coal, Iron & R.R. Co. at Whitwell, Tenn. The coke will be used by the furnace of the Chattanooga Coal & Iron Company.

West Virginia

Wheeling—The property of the Panama Coal Co., south of Moundsville, was sold recently by the receiver, to the Wheeling Coal & Coke Co. for $3800, subject to all liens against the property except the deed of trust mortgage held by a Pittsburgh banking house. The Ben Franklin Coal Co. will continue to operate the mine.

Charleston—Except for the trouble at the mines along Paint Creek in Kanawha County, the miners in West Virginia are working under satisfactory agreements and there are but few labor disputes. At the mines of the Paint Creek Colliery Co., several hundred men refused to work some time ago and since have been ordered to vacate the company houses in order that other miners may be brought in. The property is being protected by special officers, and two pitched battles between officers and supposed strikers have already taken place. In the first, nearly one hundred bullets were fired from ambush at the officers, although no one was seriously injured. This was followed in a few days by another shooting in which an unknown Italian, supposed to be from Boomer, W. Va., was killed and seven miners were arrested and committed to the Kanawha County jail. The grand jury returned indictments against twelve of the special officers, charging first-degree murder. No indictments were returned against the seven miners and they were released from custody. The situation on Paint Creek is regarded as tense and Governor Glasscock is keeping in touch with it through officers of the militia who visit the region every day. Unless the strikers vacate within a few days they will be ejected. The company offers to pay their transportation to any other mines in the county and each day about half a dozen of the strikers move out, but it is not likely that they will all leave without further trouble.

Personals

Bonner H. Hill, of Chelyan, W. Va., district mine inspector for the state, recently resigned his position to run for the office of sheriff of Kanawha County.

L. A. Schaefer, formerly manager of the T. J. Asher Coal Co., of Louisville, Ky., has resigned to become manager of the Samuel R. James Coal Co. of the same city.

W. J. Jenkins, vice-president and general manager of the Western Coal & Mining Co., was recently a visitor in Pittsburg, Kan., for several days, subsequently leaving for his home in St. Louis.

Thomas Longstaff has resigned as foreman at the Shamrock mine of the St. Bernard Mining Co., Earlington, Ky., after a service of 40 years. He will probably retain a connection with the company involving less arduous labor.

A. W. Calloway, of Punxsutawney, Penn., has been appointed general manager of the Rochester & Pittsburgh Coal & Iron Co. with offices at Indiana, Penn., effective June 15. Mr. Calloway is president of the Coal Mining Institute of America.

Frank L. Estep, of Birmingham, Ala., assistant chief engineer of the Ensley division of the Tennessee Coal, Iron & R.R. Co., has been promoted to the position of chief engineer, effective July 1 to succeed E. J. Best, who resigned some time ago.

P. A. Grady, of Williamson, W. Va., district mine inspector for the State of West Virginia, has resigned his position, effective July 1, to become superintendent for the Davy Pocahontas Coal Co., operating mines one mile from Rhodafield, on Spice Creek, in West Virginia.

George Watkin Evans, of Seattle, Wash., who recently resigned as chief of coal surveys for the Washington State Geological Survey, has gone to the Groundhog anthracite field, at the headwaters of the Skeena River, British Columbia, where he will spend the summer. Mr. Evans will examine and report on coal lands held by the National Finance Co., of Vancouver, B. C.

W. O. Snelling, consulting chemist for the U. S. Bureau of Mines, Pittsburgh, Penn., has severed his connection with the bureau and will devote his time henceforth to private work as a consulting chemist and largely to developing a process which he recently invented for liquefying gas. Mr. Snelling is a graduate of George Washington University and Harvard and has been with the Geological Survey and the Bureau of Mines since 1909. He is the originator of a number of valuable devices in connection with the use of explosives, in which subject he has been particularly interested.

Obituary

David John Sharp, manager of the Western Fuel Co., died recently at his home in Salt Lake City. Mr. Sharp was born in that city, Jan. 17, 1869, and was a graduate of the Rensselaer Polytechnic School. He had been prominently identified with the coal business of Salt Lake for a number of years, being first connected with the Utah Fuel Co., then organizing a business of his own under the name of the D. J. Sharp Coal Co., and later becoming associated with the Western Fuel Co., of which he was manager at the time of his death. Mr. Sharp was a brother of W. E. Sharp, president of the United States Mining, Smelting & Refining Company.

Publications Received

ANNUAL REPORT OF THE BUREAU OF MINES OF NEW SOUTH WALES, 1911. 213 pp., 8¼x13¼ in., illus. W. A. Gullick, Government Printer, Sydney, N. S. W.

THE EFFECTS OF COLD WEATHER UPON TRAIN RESISTANCE AND TONNAGE RATING. By Edward C. Schmidt and F. W. Marquis. Bulletin No. 59, University of Illinois. 24 pp., 6x9 in., illus. 25c. Published by the University.

ANNUAL REPORT OF THE DEPARTMENT OF MINES OF WEST VIRGINIA, 1910. John Laing, chief of the department. 802 pp., 6x9 in., 2 diagrams.

The report is presented in great detail and treats of practically all features of the coal and coke industries in West Virginia. In addition to the usual statistical data, a detailed report on the condition of every mine in the state is appended. Report is for the fiscal year, ending June 30, 1910.

DETERIORATION AND SPONTANEOUS HEATING OF COAL IN STORAGE. By Horace C. Porter and F. K. Ovitz. Technical Paper No. 16, U. S. Bureau of Mines. 14 pp., 6x9 in.

This paper is a preliminary report of investigations, a full account of which will be presented in a bulletin of the bureau. Attention is called to the fact that the deterioration of coal in storage, contrary to opinions previously held by many, is comparatively small and unimportant, so far as the loss of calorific value at ordinary temperatures is concerned. Losses of value from spontaneous heating are much more serious, however, and this matter is discussed with regard to the effect of volatile matter, the effect of moisture and sulphur and the importance of freshly exposed surfaces.

Trade Catalogs

Carnegie Steel Co., Pittsburgh, Penn. Structural Beam Sections Supplementary to American Standard Sections. 12 pp., 5x7½ in., diagrams and tables.

Ridgway Dynamo & Engine Co., Ridgway, Penn. Bulletin No. 25, Direct-Current Generators. 14 pp., 8x10½ in., illus. Bulletin No. 26, Motor-Generator Sets. 14 pp., 8x10½ in., illus.

Construction News

Carrolltown, Penn.—The Peerless Coal Co. will rebuild two large tipples near here, which were recently damaged by fire.

Morganfield, Ky.—The Drury Coal Co. is preparing to establish a barge line for handling coal. W. C. Drury, Jr., is president.

Newman, Penn.—The Elm Run Coal Co. has started work on sinking a new shaft Phillip Sonnhalter, of Massillon, Ohio, is general manager.

Pardee, Va.—The Blackwood Coal & Coke Co. will materially increase the output of its mine in the near future. The present daily output is 1000 tons.

Mannington, Ky.—The Brent-Hart Mining Co. will further develop 600 acres of coal land for a daily output of 500 tons and will require new machinery.

Elizabeth, Penn.—Extensive improvements will be made in the hauling and ventilating systems at the mine of the United Coal Co. here. S. M. Daugherty is superintendent.

Pikeville, Ky.—It is reported that the Elkhorn Consolidated Coal & Coke Co., of Helier, is preparing to install additional coke ovens. A pipe line will be built from the Elkhorn Creek to supply water for industrial operations.

Logan, W. Va.—The Pullen Coal & Coke Co. has been incorporated with a capital stock of $200,000 and will develop 1320 acres of coal land at once. The property is on a railroad and a plant will be erected at a cost of about $75,000.

Providence, Ky.—Palmer Bros., who are operating the property of the Diamond Coal Co., at Providence, will expend about $15,000 in making improvements. Two additional boilers, a large air compressor and mining machines will be installed.

Hazard, Ky.—J. T. Moore and John Gorman have leased the coal property of John & Johnson and will install a mining plant at a cost of $75,000 to have an initial output of 250,000 tons a year. One hundred miners' houses will be built and about five hundred men employed.

Birmingham, Ala.—A deal will probably be completed by July 1 by which the Republic Iron & Steel Co. will take over the property of the Palos Coal Co. A washer will probably be built at Palos at once and a coking plant installed. The present capacity of the mine is about 800 tons per day.

Salt Lake City, Utah—The Utah Fuel Co. has authorized the expenditure of over $400,000 in improvement to its properties. About $350,000 of this will be spent in increasing the capacity of the Castle Gate Coal Co.'s mine and will include the following improvements: $75,000 for underground development work; $55,000 for an electrical tramway and haulage equipment: $65,000 for a twin steel tipple, screening plant and coal-handling machinery; $45,000 for engines, boilers and electrical machinery; $15,000 for water supplies and ventilating machinery; $55,000 for dwellings and other buildings. About $100,000 will be spent at Sunnyside; $60,000 for power plant and machinery and $40,000 for dwellings and town improvements. The Utah Fuel Co. has already expended about $100,000 on preliminary work. H. G. Williams is general manager.

Coal Trade Reviews

Current Prices of Coal and Coke and Market Conditions in the Important Centers

General Review

The manufacturing demand shows a decided and general easing off throughout the country, and domestic business is down to the usual low ebb at this period of the year. This is partly due to the uncertainty in political circles, as consumers are hesitating to contract until there is some certainty as to whether a progressive or conservative party is in control. As the season advances, however, and the time for a higher price level approaches, the shrewd buyers are beginning to show more interest in the market.

Eastern shippers of anthracite claim they are not obtaining their usual share and all companies appear to be getting further behind. There is a general shortage in the prepared sizes throughout the Eastern markets, with stove leading and chestnut a close second.

In bituminous, the Eastern trade is entirely devoid of interest and profitable prices cannot be expected in such a market; slack is especially weak. There is a total absence of inquiry from possible purchasers and there are so many idle mines awaiting an excuse to go into operation that the return of active business is very uncertain.

Lake shipments from both the Ohio and Pittsburgh districts are not coming up to expectations, because of the inability of the railroad companies to furnish adequate transportation facilities; vessels are plentiful, in fact many are returning to the Northwest empty. The situation appears to be better in Ohio than around Pittsburgh, as the movement is heavier there and prices are being held quite firm.

There has been an increased activity in West Virginia and the loading at the Hampton Roads piers for the past week has been above normal for this period. Curtailment of production seems to have been effected; there are numerous inquiries for substantial tonnages and prices show no indication of weakening. The same condition prevails in Alabama, the price schedule being maintained even in the face of heavy shipments.

The past week has witnessed a general strengthening in the Middle Western market. There is little activity, as retailers are making few requisitions for the product, but operators are standing firm on prices. A number of large and small contracts are being closed and business generally is improving and in better condition than for some time.

Boston, Mass.

Bituminous continues slow, with no apparent improvement in prices. The smaller buyers are holding off and shippers who have cargoes are finding inland trade extremely dull. At the same time the season is getting on, and the shrewd buyers are bound to be interested in the market before long. It takes very little in late August or early September to turn the scale.

Some contract business has been placed on a basis of $2.60, f.o.b. Hampton Roads, but the volume is understood to be too small to be really significant.

In anthracite, stove coal is still the short size. All the companies seem to be getting farther behind each week and the outlook is not promising. The mines are understood to be up to between 85 and 90 per cent. of normal production, but there appear to be frequent local interruptions. Coal is not coming down with the usual spring regularity, and the dealers at line points and in the West are anxious to get supplies forward. Altogether, the Eastern dealer is getting rather less than his share, and there is some grumbling in consequence. Philadelphia shipments have been much better than shipments from New York. Except on Long Island Sound, the New York shippers have so far done very little.

Current prices are as follows:

Clearfield, f.o.b. mine	$1.10 @ 1.30
Clearfield, f.o.b Philadelphia	2.35 @ 2.55
Georges Creek, f.o.b. mine	1.52 @ 1.62
Georges Creek, f.o.b. Philadelphia	2.77 @ 2.87
Pocahontas, New River, f.o.b. Hampton Roads	2.50 @ 2.60
Pocahontas, New River, on cars Providence	3.40 @ 3.50
Pocahontas, New River, on cars, Boston	3.35 @ 3.55

New York

Bituminous—The bituminous trade at this point is absolutely devoid of interest. The coal business, as customary at this period of the year, is at a low ebb and few new transactions are being recorded. Because of the stocking previous to the suspension, in anticipation of a protracted shutdown at the mines, some of which stocks are still in evidence, the market is probably in even worse condition than customary at this time.

The movement still continues to be almost entirely on contract and any shipments coming in for sale in the open market are very liable to be held on demurrage. It will probably be Aug. 1 before the situation changes materially, but after that the companies are anticipating a heavy demand. It is believed there will be a heavy shortage in anthracite this fall and bituminous operators are expecting the soft-coal market to act in sympathy with the hard-coal to a certain extent.

Prices of all kinds are being quoted, but we continue the following list which is being shaded on a great many sales:

West Virginia, steam	$2.35
Ordinary grades, Pennsylvania	2.45
Fair grades, Pennsylvania	2.55@2.65
Good grades, Pennsylvania	2.70@2.80
Best Miller, Pennsylvania	3.00
Georges Creek	3.15

Anthracite—With the prospective advance of 10c. per ton on July 1, now close at hand, there is considerable activity in the anthracite market. It is now definitely understood that customary monthly advances will continue up to Sept. 1 as usual. The prepared sizes are still in short supply and sell readily at full circular prices, but there appears to be plenty of the other grades available. It is reported at this point that the mines are working up to nearly full rated capacity.

Effective Aug. 15 the Interstate Commerce Commission ordered a reduction of from 19 to 25c. per ton on the prepared grades of anthracite to the New York lighterage stations. There is considerable discussion at this point as to whether this will result in a reduction in prices.

Anthracite quotations continue about as follows:

	L.&W.	L.&S.
Broken	$4.70	$4.65
Egg and stove	4.95	4.90
Chestnut	5.20	5.15
Pea	3.50	3.45
Buckwheat	2.75	2.45
Rice	2.25	1.95
Barley	1.75	1.70

Pittsburgh, Penn.

Bituminous—The local market continues very dull, there being no retail demand to speak of, while manufacturing demand has eased off a trifle, many consumers preparing for closing their plants for a week or two for their regular midsummer repairs. The Lake coal shipments are not up to expectations, the railroad movement being slow, although there is plenty of vessel tonnage available. Prices continue soft and the regular season quotations are very indifferently maintained. They are as follows: Mine-run and nut, $1.22½; ¾-in., $1.32½; 1¼-in., $1.47½; slack, 92½c. Slack is

cut the most, occasionally selling down to 60c. or less.

Connellsville Coke—Operators are holding out for the $2.50 price on furnace coke, which they have been quoting quite uniformly for several weeks, but the furnaces are now a unit in refusing to pay this figure, and are assuming a position indicating that they would regard $2 as about the right price, though it is doubtful if any firm bids have been made. The situation has reached a point of considerable tension, the operators feeling that the furnaces will have to make a break, but the latter as a rule appear to take the ground that they can buy from time to time for early delivery until contract prices are quoted more to their liking. Operators who have had surplus coke have been curtailing production, so it is reported, in order to avoid having any free coke on the market, but the prompt market has not responded very noticeably, and it is doubtful if there has been as much curtailment in output as reported. Foundry coke is very quiet. We quote: Prompt furnace, $2.20@2.30; contract furnace (asking price) $2.50; prompt foundry, $2.35@2.50; contract foundry, $2.40@2.75.

The *Courier* reports production in the Connellsville and lower Connellsville region in the week ending June 15, at 391,792 tons, a decrease of 7000 tons, and shipments at 4241 cars to Pittsburgh, 6294 cars to points west and 1302 cars to points east, a total of 11,837 cars, an increase of 70 cars.

Philadelphia, Penn.

The anthracite market in this vicinity still lacks the activity that should characterize the opening prices, and in many quarters considerable dissatisfaction is expressed on account of the slow movement. As a matter of fact, we are now going into the usual dull season in this branch of the trade. Some coal is moving, but not in any appreciable quantities; this refers particularly to the retail trade. In the wholesale market, there seems to be a general shortage in the prepared sizes; stove coal is the leader, with egg and chestnut a close second.

Of course, as is always the case at this season of the year, there will be a surplus of certain sizes at times, and the individual operators, not having any storage capacity, have been cutting prices somewhat, but generally the circular prices are being well maintained. It is understood that very little new business is coming in, but the companies are well supplied with orders, sufficient to keep them going for at least a month or three weeks. Disappointment is still expressed that the output of the mines has not reached normal. Men are very slow in coming back, and at some places it is reported to be difficult to secure sufficient men to make a fairly good showing. However, this condition is improving.

Bituminous trade still looks forward to an improvement, but not before Sept. 1, and until that time, it is admitted that the depression is likely to continue. Prices still remain unchanged, unless the coal is on demurrage, when quotations are low.

Baltimore, Md.

Dullness prevailed in the Baltimore market during the past week; if any new business was booked, a careful inquiry among local operators failed to discover it. There was even an absence of inquiries from possible purchases, and nothing whatever transpired which would hold out the slightest encouragement to the trade for an early improvement in business. Many hoped that the inquiries which developed a week or so ago would result in the closing of a few large orders, but they were disappointed.

The coal offices report weak prices for the product, slack, especially. In many instances this latter could not be sold at 40c., while ordinarily Baltimore dealers get 50 and 60 in busy times for all they can supply. Profitable prices are not expected for any coal in such a market as exists here at the present time.

A feature of interest during the week, was the award of the Government contract, calling for the delivery of 18,000 tons of bituminous coal at the Naval Academy, Annapolis; this contract went to the Consolidation Coal Co. The Government has adopted the B.t.u. test on its Annapolis contracts, which makes it difficult for many of the local companies to bid. Some of the local companies raised their bids, too, on account of the provision in the contract calling for deliveries as wanted. Heretofore, the successful bidders were at liberty to begin delivery as soon as the contract was signed, which in many instances was as early as Aug. 1.

Buffalo, N. Y.

There is an occasional bituminous dealer who finds the demand better and prices stronger, but such is not the rule. Some of the larger members of the trade, who predicted that this year was going to be much better than last are now saying that they do not look for any change from the present prices till the first or middle of September. At the same time there are so many idle mines, waiting for an excuse to go into operation, that the return of good business is very uncertain.

The jobber in bituminous is for the most part the one who makes the greatest profit. He is commonly obliged to do so and is only sorry that the operator demands a good profit also or will allow this mine to lie idle. The fast growing demand for anthracite is likely to help bituminous before long. Members of the trade are saying already that the consumer who does not lay in his supply this summer will regret it later. Others say that there is likely to be need of quite an amount of bituminous as a substitute for anthracite before next spring.

Buffalo is so near to the anthracite mines that there is not much stir yet in this trade, but some of the shipping agents are already cutting down all their orders. They say that the mines are running at a very low capacity with not much chance of getting a full supply of men right away. Stove is rather scarcer than chestnut and is likely to continue so.

With only three of the four or five Lake shippers of anthracite active, the amount loaded into vessel last week was 133,000 tons, which is considerably above the usual summer average, yet the shippers are far from satisfied.

Quotations of bituminous remain weak as formerly, $2.57½ for Pittsburgh three-quarter, $2.47½ for mine-run and $2.10 for slack, with coke still very quiet on the basis of $4.50 for best Connellsville foundry.

Cleveland, Ohio

Conditions certainly have not improved here during the past week. Very little coal is coming to this market; there is little demand, and low prices are prevailing; slack has gone begging during the past week. No. 8 Pittsburgh has sold as low as $1.35, No. 6 at $1.30 and the coarser grades the same, selling even lower than before the suspension, in spite of the advance rate to the miners. There still seems to be considerable coal on hand.

The Lake trade would be active if coal could be brought in faster, as boats are plentiful but are having trouble in getting cargoes, and consequently returning light. The ore trade continues good, and vessels do not wait for coal cargoes if sufficient is not immediately on hand to load promptly. The reports are, however, that Lake coal will move more freely in the next two weeks. The reason for the small arrivals is said to be due to a labor shortage at the mines.

Detroit, Mich.

Bituminous—There are a number of cars of Ohio and West Virginia coal on track here at the present time, some of which have as high as 6 to 8 days demurrage on them. One large operator has more than 60 cars on the Pere Marquette R.R. The Michigan Central refuses to accept cars from the Pere Marquette, and and he is required to pay demurrage for coal he has already ordered delivered.

Most of the large steam plants are stocked to their utmost capacity and refuse to accept any more cars from ship-

pers. This will depress the market for some time to come. West Virginia slack is quoted at 40c., mine-run 60c. and 1¼-in. lump has been sold as low as 75c., f.o.b. mines, while last year at this same season West Virginia slack sold for 65c., mine-run for 90c. and 1½-in. lump at $1.10. There is little, if any, of Ohio coal being disposed of, consequently Detroit is receiving no shipments from these fields.

Anthracite—Hard coal is coming in at very long intervals, and so uncertain is the outlook that the dealers have refused to make any contracts for any future business. This product has advanced 50c. per ton on all sizes, and it is now predicted that it will go beyond that. One large consumer tried to place an order for 6000 tons, but the mines could only guarantee shipments on 160 tons.

The market today on grate, egg and stove sizes is $7.50, and on chestnut, $7.75, f.o.b. Detroit.

Columbus, Ohio

Continued activity in the Lake trade characterized the coal business in Ohio during the past week. Practically all of the larger operators in the Hocking Valley are shipping a large tonnage to the Northwest and the eastern Ohio district is also starting to ship more coal to the Lakes. The general result is a considerable activity in every mining district of the state, excepting those which produce domestic grades only.

Prices prevailing in the Ohio fields are:

Hocking Valley	
Domestic lump	$1.50
¾-in	1.35
Nut	1.15
Mine-run	1.10
Nut, pea and slack	0.65
Coarse slack	0.55
Pittsburgh No. 8	
¾-in	1.20
Mine-run	1.10
Coarse slack	0.65
Pomeroy Bend	
Domestic lump	$1.50
¾-in	1.35
Nut	1.20
Mine-run	1.15
Nut, pea and slack	0.65
Coarse slack	0.50
Kanawha	
Domestic lump	1.50
¾-in	1.30
Mine-run	1.35
Nut, pea and slack	0.65
Coarse slack	0.50

Prices on all grades are holding firm and there is some speculation as to an advance in quotations. The consensus of opinion appears to be that the advance will not take place before Aug. 1 unless there is an acute car shortage previous to that time. Sales agents believe that the car shortage which is bound to come will force an advance sooner or later but not before another month.

More activity is shown in the steam business, although the tonnage continues below normal because of the surplus accumulated before the suspension. General industrial conditions, however, are slightly improved and this is expected to be reflected on the volume of business.

Production in Ohio mines has been fairly good in certain districts. In the Hocking Valley and Pomeroy Bend districts the output has been up to normal while eastern Ohio has been steadily increasing its tonnage. In the strictly domestic fields there is not much doing yet.

Hampton Roads, Va.

As predicted in the last issue, there has been more life to the coal market at Hampton Roads this week than during the two previous weeks of this month. Each of the three piers were kept quite active all week; in fact, on one or two occasions, vessels were obliged to wait for berths; needless to say, this is an abnormal condition at this season of the year. On Tuesday night, a severe electrical storm played havoc with the wires, and both Sewells Point and Lamberts Point were without light or power for several hours.

There are no indications of a weakening in prices over those named last week; curtailment of shipments appears to be the watchword, and coal is not piling up at the piers as it did earlier in the month. There are numerous inquiries for substantial tonnages, and while most of them are for spot shipment, one or two good-sized contracts are on the market.

What is said to be the first cargo of coal ever shipped from this port for Venice, Italy, left here Wednesday per Steamship "Columbia," carrying 7600 tons. While local coals have been exported to other Italian ports, this seems to be the initial cargo for Venice.

Birmingham, Ala.

The schedule of prices is being maintained in the Birmingham market even in the face of very heavy shipments; for spot delivery, however, prices have weakened. Retailers are stocking with more coal than last year, the severe winter having caught them short of supply and they want to avoid a recurrence of that situation. Steam consumers are also stocking heavily, while considerable coal is moving to gulf ports for bunkerage use at a close price in order to avoid a demoralizing surplus in the natural trade territory.

Large contracts are being offered in the Alabama field at this time, some of considerable size having been closed at prices in keeping with current quotations. Most of the operators believe that mining operations are being overdone for this season of the year and that operators will be facing the necessity of curtailing to some extent during the next month.

It is very apparent that the iron furnaces cannot help consumption before Aug. 1 and then only to a limited extent. If iron prices continue to improve, there is no doubt that by the end of the year several furnaces will be ready to operate and thereby largely increase the demand for coal.

Nashville, Tenn.

There is no activity in this market at present, there being practically no spot coal business. The retailers are taking almost nothing and it will probably be some four weeks before the domestic business will commence to move. However, the outlook for the coming season, as far as prices are concerned, is better than ever. This section will probably never see high-priced coal, on account of the vast over-production and the limited market, but every indication points to better prices for the early fall than has prevailed for many months.

There is practically no change in the quotations as given last week, which are as follows:

Standard lump	$1.10@1.15
Standard nut	1.10@1.15
Mine-run	0.85@0.90
1¼-in. screenings	0.40@0.50

Indianapolis, Ind.

The feature of the coal industry here during the week was a falling off in the demand for steam coal and a general dullness in domestic; the higher price of the latter is said to be the cause. Buyers hesitate to stock up as they know the increased cost of mining, under the new contract, is being added to the product. Nearly all of the mines were running this week, though a few were idle.

There is no use denying the influence that politics is now having over the coal business and other allied industries. Until the nominations are made, and it is known whether the candidates will be progressive or conservative, coal dealers will refuse to make extensive contracts to cover their requirements, as they usually do this time of the year. Notwithstanding these uncertainties, the Indiana coal operators are standing firm for the advanced prices, and say what coal is not sold now during the summer months will be sold later and perhaps at still better prices. They figure that coal which is not shipped on reduced contracts must be bought in the open markets, and that the longer storing is delayed, the better the price will be.

Chicago

Smokeless mine-run occupies an exceptionally strong position on the Chicago market at $1.10, with lump and egg at $1.50, f.o.b. mines. A larger number of consumers are placing rush orders in preparation for the advance in price scheduled for Aug. 1.

The market for Western screenings is also good; this is due chiefly to a lessening in production. A number of observers predict that the price of screenings will be advanced substantially within a short time. On account of the threshing season the demand for block coal is unusually heavy.

Because of the advance in anthracite prices, dealers were slow at first in placing their orders, but an increasing volume of business along this line is now being noted. Gas-house coke is showing exceptional strength for this season of the year.

Prevailing prices at Chicago are:

Sullivan County	
4-in. lump	$2.47
Egg	2.37
Mine run	1.99½
Screenings	1.87@1.97
Springfield	
Domestic lump	$2.32
Steam lump	1.97
Mine-run	1.82
Screenings	1.67@1.72
Clinton	
Domestic lump	$2.27
Steam lump	2.12
Mine-run	1.92
Screenings	1.77@1.82
Pocahontas and New River	
Mine-run	$3.15
Lump and egg	3.55

Coke—Prices asked for coke are: Connellsville, $4.85@4.90; Wise County, $4.75; byproduct, egg and stove, $4.65; byproduct, nut, $4.55; gas-house, $4.65.

St. Louis, Mo.

The past week has been considerably better than at any time since last March. Several of the large and small contracts have been closed up, and business in June is improving. Indications are that from this time on there will be a greater volume of coal moving, but it seems with the increased demand there comes an increased tonnage, and coal continues selling at from 5 to 10c. below the cost of production.

Carterville mine-run has been offered as low as 97½c., lump and egg for $1.10, and nut for $1, for current business, but these prices are below the average.

The prevailing prices are:

Franklin County	
6-in. lump	$1.35@1.50
3x6 egg	1.35@1.50
Nut	1.35@1.50
No. 2 nut	1.25@1.35
Screenings	0.90@1.00
Carterville	
6-in. lump and 3x6 egg	$1.20@1.35
Nut	1.15@1.25
Screenings	0.90@1.00
Washed No. 1	1.50@1.60
Washed No. 2	1.30@1.40
Washed No. 3	1.25@1.35
Washed No. 4	1.15@1.20
Washed No. 5	0.90@1.00
Mine-run	1.05@1.10
Mount Olive	
Lump	$1.15@1.25
Nut	1.00@1.10
Screenings	0.90@0.95
Standard	
2-in. lump	$0.85@0.95
6-in. lump	0.90@1.00
Screenings	0.85@0.90
Mine-run	0.85@0.90

Portland, Ore.

The coal companies here have been unable to announce storage prices yet this year, and they do not know whether they will be in position to do so or not, since they have received no word indicative thereof.

This being the warm season of the year here, there is very little business in coal for domestic purposes. Prices have shown no change since early in the year. Nothing new has been reported from Australia and it is expected that importation from that source will be light the coming fall and winter.

Production and Transportation Statistics

Ohio Coal-Traffic Statement

The following is a comparative statement of bituminous shipments over the principal Ohio railroads for the first 4 months of the current year and last year in short tons:

	1911	1912
Hocking Valley	214,821	20,123
Toledo & Ohio Central	145,313	12,543
Baltimore & Ohio	138,455	30,235
Wheeling & Lake Erie	248,435	34,847
Cleveland, Lorain & Wheeling	205,230	57,327
Zanesville & Western	75,896	12,994
Toledo division, Pennsylvania Co.	149,012	99,029
Lake Erie, Alliance & Wheeling	82,268	6,663
Marietta, Columbus & Cleveland Ry.	2,271	3,478
Wabash, Pittsburgh Terminal Ry.	6,574	
Kanawha & Michigan Ry.	2,405	1,173

Exports

The exports of anthracite during April of the current year amouted to 80,654 tons as compared with 375,723 tons in April of last year. Bituminous exports for April of this year, exclusive of bunker or fuel coal laden on vessels in the foreign trade, were 1,225,802 tons as compared with 870,665 tons for the same month last year. Bunker or fuel coal laden on vessels in the foreign trade during April of this year amounted to 707,815 tons, as compared with 539,320 tons during the same month last year. Coke exports fell off during April of this year to 75,232 tons, as compared with 91,476 tons for the same month last year.

Southwestern Tonnage

The Southwestern Interstate Coal Operators' Association has issued the following comparative statement of tonnage for February:

State	1911	1912	Increase
Missouri	215,686	365,314	149,628
Kansas	409,513	586,217	176,704
Arkansas	120,886	187,014	66,128
Oklahoma	207,200	311,492	104,292
Totals	953,285	1,150,037	496,752

This statement only covers the tonnage of members of the association which we estimate to be at least 95% of the entire tonnage produced in the four states. The tonnage of Bache and Denman in Oklahoma and Arkansas is now included.

Foreign Markets

British Exports—The following is a comparative statement of the British fuel exports for May and the first 5 months of the current year:

	May		
	1911	1912	5 mos.
Anthracite	220,306	196,423	784,220
Steam	4,506,806	4,659,433	14,791,968
Gas	1,011,706	1,120,763	3,326,247
Household	138,926	140,711	485,599
Other sorts	328,089	331,706	1,028,645

Financial Notes

Dominion Coal Co., Ltd.—This company has called the 92 first mortgage 5% sinking fund gold bonds dated May 1, 1905, of $1000 each, and the 36 of $500 each for payment on May 1, at 105 and interest, at the Royal Trust Co., Montreal.

The Delaware & Hudson Co.—This company uniquely reports approximately the same percentage earnings in each of the past four years. These have ranged from 12.22% in 1909, to 12.54% in 1910. Surplus, after 9% dividends, has run close to $1,400,000 yearly for four years.

Four States Coal Co.—Directors of this company recommend an increase in the capital stock from $1,500,000 preferred to $2,500,000, proceeds to be used to complete equipments at Annabelle No. 2 mine, and enable another mine to be developed at Dorothy, which will increase production to 3,000,000 tons per annum and earnings to $1,000,000.

New England Coal & Coke Co.—Notwithstanding the fact that this company delivered 14% more coal in January of this year than in the same month last year and 4% more in February this year than February last year, net profits for the two months are substantially less. This is ascribed to the fact that the company spared no expense in delivering their product during the severe weather prevailing during those two months of the year. This company has paid annual dividends of 10% during the past two years.

Lehigh Coal & Navigation Co.—Capital stock of this company which, Dec. 31, 1910, amounted to $24,172,850, including $25,900 held in the treasury, was increased to $26,587,650 by the action of the board of managers, Jan. 23, 1911, and the outstanding capital stock has been increased to $26,557,950 by the 10% stock allotment at par, which was paid for between May 15 and 27, 1911. The amount thus received provided in part funds necessary for the payment at maturity, June 1, 1911, of $2,471,000 of bonds issued under the consolidated mortgage 7% loan of 1871.

Reading Co.—In event that this company distributed its coal-land holdings in stock of a separate company or organized a coal sales company and gave its stock away, the Baltimore & Ohio and Lake Shore would become large holders of such coal company stocks. Reading itself could scarcely hold the stock of Lehigh & Wilkes-Barre Coal Co., or of a selling company handling that producer's coal, because in any distribution it would receive a controlling interest. Apparently it would have to pass such stock along to its stockholders, including the Baltimore & Ohio and Lake Shore.